



# PIÑON CANYON MANEUVER SITE (PCMS) TRAINING AND OPERATIONS

## DRAFT ENVIRONMENTAL IMPACT STATEMENT



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**Executive Summary Table of Contents**

|                                                                    |            |
|--------------------------------------------------------------------|------------|
| <b>S. Executive Summary</b>                                        | <b>S-1</b> |
| S.1 Introduction                                                   | S-1        |
| S.2 Installation Setting and Mission                               | S-1        |
| S.3 Purpose of and Need for the Proposed Action                    | S-1        |
| S.4 Decisions to be Made and Framework for Analysis                | S-1        |
| S.5 Proposed Alternatives                                          | S-2        |
| S.7 Designation of the Army Preferred Alternative                  | S-3        |
| S.8 Alternatives Considered but Dismissed                          | S-3        |
| S.9 Stakeholder Outreach                                           | S-4        |
| S.9.1 Public and Agency Coordination                               | S-4        |
| S.10 Environmental Consequences                                    | S-4        |
| S.10.1 Land Use                                                    | S-5        |
| S.10.2 Air Quality and Greenhouse Gases                            | S-5        |
| S.10.3 Noise                                                       | S-5        |
| S.10.4 Geology and Soils                                           | S-6        |
| S.10.5 Water Resources                                             | S-6        |
| S.10.6 Biological Resources                                        | S-6        |
| S.10.7 Cultural Resources                                          | S-7        |
| S.10.8 Socioeconomics                                              | S-7        |
| S.10.9 Traffic and Transportation                                  | S-7        |
| S.10.10 Airspace                                                   | S-8        |
| S.10.11 Facilities and Utilities                                   | S-8        |
| S.10.12 Hazardous Materials, Hazardous Waste, and Toxic Substances | S-8        |
| S.10.10 Summary of Environmental Effects                           | S-9        |
| Table S-1. Summary of Adverse Environmental Effects                | S-10       |
| Table S-2. Additional Mitigation and Best Management Practices     | S-15       |

1

2

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## **S. Executive Summary**

### **S.1 Introduction**

The Department of the Army is preparing this Environmental Impact Statement (EIS) in compliance with its responsibilities under the National Environmental Policy Act (NEPA; 42 United States Code [USC] Parts 4321-4370h), Council on Environmental Quality [CEQ] Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] Parts 1500–1508) and Department of Army regulations for implementing NEPA (32 CFR Part 651) to assess the potential direct, indirect, and cumulative impacts to environmental, cultural, and socioeconomic resources as it pursues actions to enable future mission and training operations at the Piñon Canyon Maneuver Site (PCMS). As the Federal Aviation Administration (FAA) is a cooperating agency for this action, this EIS has also been prepared in accordance with FAA Joint Order 7400.2K, effective April 3, 2014, *Procedures for Handling Airspace Matters*, and FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*.

### **S.2 Installation Setting and Mission**

PCMS is a military maneuver site for Fort Carson, Colorado. PCMS is located near Trinidad, Colorado, approximately 150 miles southeast of Fort Carson, and consists of approximately 235,000 acres. The primary PCMS mission is to support maneuver training for large ground forces that need large contiguous maneuver and training areas. PCMS is an important training center and is vital to Fort Carson's preparation of Soldiers for combat missions as it supports large training exercises that cannot be accommodated on Fort Carson alone, because of the volume of maneuver training required.

### **S.3 Purpose of and Need for the Proposed Action**

The purpose of the Proposed Action is to train Fort Carson Brigade Combat Teams (BCTs) in full brigade-size exercises at PCMS, and allow additional training opportunities using new tactics and equipment. The Army needs to conduct realistic coordinated large-scale training that integrates the ground and air resources of assigned and visiting units, including mechanized, infantry, support, and combat aviation assets. To accomplish this, the Army must maintain large maneuver and training areas of varying characteristics with complex terrain. Advances and changes in equipment and weapons systems and in their coordinated use require changes to the manner in which PCMS is internally configured and utilized.

### **S.4 Decisions to be Made and Framework for Analysis**

This EIS evaluates the direct, indirect, and cumulative effects of the No Action and Proposed Action alternatives. It was prepared in accordance with the NEPA of 1969 (42 USC 4321 et seq.), CEQ regulations (40 CFR Parts 1500-1508, *Protection of Environment*), the Army's own NEPA regulation (32 CFR Part 651, *Environmental Analysis of Army Actions*), and the NEPA Analysis Guidance Manual (USAEC, 2007).

The decision sought from the EIS NEPA process is the selection of one of the alternatives. The final decision and rationale for selection will be presented in a Record of Decision (ROD), which will be signed no earlier than 30 days from the publication of the Notice of Availability (NOA) of the Final EIS. The ROD will articulate the decision made, provide supporting explanation, and identify mitigation measures. It will explain both the pertinent factors relied on in making a selected decision and how the final alternative meets the purpose and need. Once the ROD is

signed, the Army will forward a NOA to the Federal Register, announcing the availability of the ROD for public review.

Because the Army's Proposed Action involves the potential reclassification of special use airspace (SUA) over PCMS, the FAA has agreed to become a cooperating agency for this EIS. The FAA is responsible for managing navigable airspace for public safety and ensuring its efficient use for commercial air traffic, general aviation, and national defense, including SUA utilized by the Department of Defense.

## **S.5 Proposed Alternatives**

### **S.5.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS**

Under the No Action Alternative, current mission activities and training operations, and range use and training land management would continue. Management would continue to conduct routine maintenance and support operations. Established parameters for brigade-level training would continue to be utilized. This alternative, required by NEPA regulations, encompasses baseline conditions and will serve as a benchmark against which the environmental impacts of the Proposed Action alternatives can be compared.

### **S.5.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

Proposed Action Alternative 1A would establish and use new brigade-level training intensity measures, update brigade training period equipment compositions and training methods relative to the 1980 EIS, and enable the Stryker family of vehicles to train at PCMS. This alternative would establish a benchmark for brigade-level training intensity using the Army's Training Circular 25-1 (TC 25-1), *Training Land* within PCMS in conjunction with Fort Carson's current brigade-level training activities at PCMS. This alternative would enable the 1/4 Stryker BCT (SBCT) to conduct training at PCMS using its assigned equipment and Stryker family of vehicles. This alternative only considers activity within the established boundaries of PCMS, with a limited exception – transportation of equipment and Soldiers to and from PCMS would entail some degree of off-post activities.

### **S.5.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

Proposed Action Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using the following new tactics, equipment, and infrastructure improvements at PCMS:

- **Aviation Gunnery (non-explosive) and Flare Training.** Enhance training readiness of Army aviation assets through non-explosive aviation gunnery and flare training.
- **Electronic Jamming Systems.** Train using electronic warfare technologies that are intended to jam enemy cell phones, FM radios, ground-based sensors, improvised explosive devices (IED) and other enemy related communications through use of active or passive energy.
- **Laser Targeting.** Train using vehicles with mounted or dismounted laser designators and range finders. This would include air-to-air, air-to-ground, ground-to-air and ground-to-ground laser use, not to extend beyond PCMS boundaries or designated airspace.
- **Demolitions Training.** Conduct demolitions training in eight proposed designated explosive breach sites within Training Areas 7 and 10. Explosive use would include C4

(explosive), trinitrotoluene (TNT), plastic explosives, detonating cord, bangalore torpedoes, blasting caps, timed fuses, and igniters.

- **Unmanned Aerial Systems Training.** Provide for increased training frequency for the Raven and Shadow Unmanned Aerial System (UAS) for units training at PCMS.
- **Unmanned Ground Vehicle Training.** Enable training reconnaissance and improvised explosive device (IED) training using lightweight classes (500 pounds or less) of Unmanned Ground Vehicles.
- **Airspace Reclassification.** Request the FAA to reclassify a portion of the SUA that overlies PCMS (not to extend beyond the boundaries of PCMS) to Restricted Area (RA). The airspace reclassification is required to conduct integrated and realistic air and land training, aviation gunnery, and airborne laser target sighting system training.
- **Drop Zone Development.** Establish two new drop zones (DZs) within PCMS, free of obstructions and landing hazards such as hazardous woody growth (i.e., tree stumps), marking stakes, and fences to provide for more suitable and safer locations for drops.

The Proposed Action alternatives do not include, nor would they require, any expansion of PCMS. No additional land would be sought or acquired as a result of this action. No facilities construction are required to support PCMS training operations under the Proposed Action alternatives. Foreseeable future construction of facilities is analyzed within the cumulative impacts discussion in Chapter 4 of the EIS.

## S.7 Designation of the Army Preferred Alternative

The Army has identified Proposed Action Alternative 1B as its Preferred Alternative. This was based on information in this EIS as well as factors relating to PCMS training mission and the purpose and need.

## S.8 Alternatives Considered but Dismissed

An alternative considered but dismissed was to provide integrated, combined arms training for Fort Carson units at other military installations. For the same reasons the 1980 EIS identified, it would not be practical to transport equipment to other, more distant training facilities. Such an action would result in lost training time for Soldiers and inefficient use of appropriations (funds) for training due to increased costs that would result from extensive logistics and transportation. Requiring basic skills to be learned away from the home station would also unnecessarily increase the time Soldiers are separated from their Families, potentially having a negative impact on Soldier and Family quality of life.

Another alternative considered but dismissed was to provide Soldiers with simulated training. This alternative, however, would not prepare Soldiers for deployment as technology has not advanced sufficiently to enable simulations alone to provide Soldiers and units adequate training to meet doctrinal training readiness standards.

The Army declined to formally consider closure of PCMS as an alternative, as was suggested by various persons in the scoping process, because it failed all aspects of the screening criteria. Additionally, it would not meet the purpose and need of the proposed action because it would eliminate the ability of Fort Carson Soldiers to execute brigade-level training at their home station.

## **S.9 Stakeholder Outreach**

### **S.9.1 Public and Agency Coordination**

On March 25<sup>th</sup>, 2014, the Army issued a Notice of Intent (NOI) in the *Federal Register* to prepare an EIS. The NOI initiated the public scoping period where members of the public (including Federal, state, and local agencies, affected Federally-recognized Native American tribes, and other interested persons) were invited to comment on the proposed scope and content of the EIS. The NOI was followed by two public scoping meetings on May 6<sup>th</sup> (Trinidad) and May 7<sup>th</sup> (La Junta), 2014.

During the public scoping period, comments were considered in preparation of this Draft EIS to promote open communication and enable better decision-making. Comments received primarily asked the Army to consider closure of PCMS as an alternative. Other common concerns were the impact of increased training and training activities on sustainability of the land and on natural and cultural resources within and adjacent to PCMS.

Following the scoping period, a Draft EIS was prepared and filed with the U.S. Environmental Protection Agency (USEPA), and the Army published a NOA in the *Federal Register* and local newspapers announcing the availability of the Draft EIS. This announcement began the start of a 45-day comment period. During this period, public meetings will be held to allow the public, organizations, and regulatory agencies to present comments and information. The Army will consider all comments submitted by individuals, agencies, or organizations. Following review of comments and appropriate revisions, the Final EIS is filed with the USEPA and made publically available through a NOA publication in the *Federal Register*. A final decision on the Proposed Action (documented in a ROD) may be made after a 30-day waiting period. A ROD is a public document that states the decision, alternatives and factors considered, and the proposed mitigation adopted. The NOA of the ROD is published in the *Federal Register*. Upon signature of the ROD, the Army can begin to implement the decision (32 CFR 651.45(j)(2)).

## **S.10 Environmental Consequences**

To maintain a consistent evaluation of impacts in the EIS, and in accordance with the Army NEPA regulations (32 CFR Part 651), thresholds of significance were established for each resource. Although some thresholds have been designated based on legal or regulatory limits or requirements, others reflect discretionary judgment on the part of the Army in accomplishing its primary mission of military readiness, while also fulfilling their conservation stewardship responsibilities. Quantitative and qualitative analyses have been used, as appropriate, in determining whether, and the extent to which, a threshold would be exceeded. Based on the results of these analyses, this EIS identifies whether a particular potential impact would be adverse or beneficial, and to what extent. Thresholds of significance are detailed in Chapter 3 of the EIS.

Table S–1 at the end of this section presents a summary of the overall environmental consequences of the No Action and Proposed Action alternatives (Alternative 1A or Alternative 1B). The characterizations of the effects presented in Table S-1 represent the greatest potential impacts expected for each resource area from implementation of the entire alternative. The comparison of the potential impacts provides a tool to assess the overall impacts for each alternative. Implementation of either the No Action or one of the Proposed Action alternatives would result in some degree of adverse effect on most environmental resources analyzed in the Draft EIS. As shown in Table S-1, cumulative impacts by resource vary and could be reduced to less than significant with the implementation of mitigation measures (see Section S.10.10). A detailed analysis of cumulative effects is discussed in Chapter 4 of the EIS.



### **S.10.1 Land Use**

No changes to current land use designations would occur under the No Action Alternative, and there would be no new impacts. Military lands would continue to experience disturbance and require restoration to sustain lands for military use. Training restrictions would continue to limit recreational opportunities (e.g., hunting) and heritage tourism opportunities within PCMS lands. Noise traveling off post may continue to discourage development, disturb sensitive residences, and impact nearby livestock and ranching activities.

BCT training activities at PCMS as part of Proposed Action Alternative 1A could degrade training lands. Effects to the long-term availability of training lands for military use would result in moderate adverse land use impacts from Armor BCT (ABCT) or combined BCT training activities within PCMS. Mitigation through enhanced application of land management programs, training land rotation, and other restoration efforts would offset training impacts and maintain quality training lands for sustained military use.

Under Alternative 1B, aviation gunnery actions would require the establishment of two new surface danger zones that would result in minor adverse impacts to land use. Demolitions training could result in moderate increases in noise, which could result in minor indirect impacts to land use. Negligible impacts include aesthetic impacts from nighttime flare visibility, visibility impacts from fugitive dust, and increased potential for wildfires causing wildlife to migrate onto agricultural and private lands. Training restrictions would continue to limit recreation and heritage tourism on post. These impacts would be minor to moderate.

### **S.10.2 Air Quality and Greenhouse Gases**

No changes would result to air quality or greenhouse gases (GHGs) under the No Action Alternative; overall minor adverse impacts are anticipated. Fort Carson would continue their current use of fossil fuels for mobile and temporary sources at PCMS, resulting in similar levels of emissions of both criteria pollutants and GHGs.

Minor impacts to air quality and GHGs would occur under Proposed Action Alternatives 1A and 1B. Long-term minor effects would occur from increased vehicle exhaust and fugitive dust from maneuvers due to recent changes in BCT training intensity, as well as from readiness training using new tactics and equipment at PCMS. Emissions would not threaten the attainment status of the region, adversely affect nearby Class I areas, exceed the GHG thresholds, nor would they contribute to any regulatory violations. No stationary sources would be established. All activities combined would generate some amount of GHG emissions; however, there would be no new stationary sources of GHG emissions that would exceed the CEQ presumptive effects threshold.

### **S.10.3 Noise**

No changes would result to the noise environment from the No Action Alternative; therefore, no adverse impacts are anticipated. Installation operations and the current levels of training noise would continue without change. Fort Carson would continue to implement its Integrated Operational Noise Management Plan (IONMP) at PCMS to limit off-post noise impacts.

Proposed Action Alternatives 1A and 1B would have long-term negligible impacts to the noise environment, with the exception of aviation gunnery and demolitions training under Alternative 1B. Aviation gunnery training would cause minor adverse impacts to the noise environment at PCMS. Demolitions training would constitute a distinct and appreciable change in the overall noise environment at PCMS. Moderate long-term adverse impacts to the noise environment at PCMS would occur. The proposed aviation gunnery and demolitions activities would have minor effects to off-post areas.

#### **S.10.4 Geology and Soils**

Under the No Action Alternative, there would be no changes to current training levels or Installation operations. Impacts of current training to geology and soils are significant; however, Fort Carson would continue to implement its Integrated Natural Resources Management Plan (INRMP) and Integrated Training Area Management (ITAM) program at PCMS to manage impacts to soil resources.

Proposed Action Alternative 1A would have the potential for long-term moderate to significant adverse effects to soils from BCT training, as well as minor to moderate indirect impacts from increased surface water runoff and soil erosion. Direct impacts include loss of vegetative cover, compaction and loss of soil strength and structure, and soil loss through water or wind erosion. Indirect impacts include increased surface water runoff and acceleration in erosion downslope. Adverse impacts have the potential to be reduced to less-than-significant levels with implementation of mitigation measures but may require extended years of effort or continuous effort depending on the extent of mitigation efforts.

Proposed Action Alternative 1B would have moderate to significant impacts to soil for the reasons described above for Proposed Action Alternative 1A. Direct impacts associated with the aviation gunnery actions would result in minor impacts due to modification of the soil surface and dislocation of soil particles into the air from the impact of rockets and ballistics. DZ development has the potential to cause minor adverse impacts to soils due to hazards removal (i.e., tree stumps) and disturbance of soils at the area of drop contact. The demolitions training would cause local disturbances of soils in the area of detonation impact. Depending on the location of the charge and intensity, impacts to soils would be minor to moderate. Combined elements under Proposed Action Alternative 1B would have significant impact to soils.

#### **S.10.5 Water Resources**

Under the No Action Alternative, there would be no changes to current training levels or installation operations. Impacts of current training to water resources would be minor and would remain unchanged. Fort Carson would continue to implement its INRMP and ITAM program at PCMS to manage impacts to water resources.

BCT training under Proposed Action Alternative 1A could result in individually minor to moderate impacts to water resources. BCT training could cause sediment loading and an increase in naturally occurring selenium in the Purgatoire River and Timpas Creek (both listed as 303(d) impaired for selenium). Increases in training intensity per BCT could also result in degradation of stream channels and banks during training maneuvers, particularly when crossing dry drainages or training in wet conditions.

Individual impacts would be less than significant under Proposed Action Alternative 1B. Proposed Action Alternative 1B would create localized soil disturbances from aviation gunnery, demolition training, and DZ development that could result in minor impacts from erosion and sedimentation of local waterways. Potential surface water contamination could occur from accidental spills of hazardous materials associated with vehicles and equipment (i.e., oil, fuels, solvents). The combined elements of Proposed Action Alternatives 1A or 1B could result in significant water resources impacts.

#### **S.10.6 Biological Resources**

Under the No Action Alternative, there would be no changes to existing training levels or operations occurring at PCMS and impacts to biological resources would remain unchanged and moderate. Fort Carson would continue to implement its INRMP, Integrated Wildland Fire

1 Management Plan, Forest Management Plan, and Invasive Plants Management Plan to manage  
2 impacts to biological resources occurring from ongoing training activities.

3 Under Proposed Action Alternative 1A, there could be increased vegetation disturbance during  
4 training maneuvers, especially if conducted by heavy, tracked, and Stryker vehicles in wet  
5 conditions. Individual BCT training would cause minor to moderate impacts. Combined,  
6 significant impacts could occur depending on the intensity and frequency of BCT training and  
7 the ability of the land to recover. Impacts could be reduced to less-than-significant levels with  
8 implementation of the mitigation measures. Increased intensity of training could also result in  
9 minor to moderate adverse impacts to wildlife species within PCMS.

10 Training using aviation gunnery and demolitions under Proposed Action Alternative 1B would  
11 disturb soils, impact wildlife, and remove or degrade vegetation at and surrounding temporary  
12 targets or blast zones. Impacts caused by these types of training would be minor to moderate  
13 and localized in nature. In addition, wildlife species in the vicinity of the point of impact could be  
14 injured or killed. Laser training has the potential for minor to moderate impacts on wildlife  
15 species.

16 Less than significant impacts to biological resources could also occur from noise, increased  
17 potential for wildland fire and the spread of noxious plants, and use of laser and electronic  
18 jamming systems.

### 19 **S.10.7 Cultural Resources**

20 Under the No Action Alternative, there would be minor adverse effects to cultural resources.  
21 Range maintenance, upgrade, and training activities would occur in accordance with existing  
22 procedures. Fort Carson would continue to manage and protect their cultural resources  
23 according to the 2014 *Programmatic Agreement (PA) Among U.S. Army Garrison Fort Carson,*  
24 *Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation*  
25 *Regarding Military Training and Operational Support Activities at Piñon Canyon Maneuver Site,*  
26 *Fort Carson, Colorado* and the Integrated Cultural Resources Management Plan (ICRMP).

27 The potential impacts of proposed BCT training activities for Proposed Action Alternative 1A  
28 would result in negligible to minor impacts to cultural resources. Negligible to minor impacts  
29 would also be anticipated from other training activities associated with Proposed Action  
30 Alternative 1B. Fort Carson would manage and monitor cultural resources to conditions of the  
31 2014 PCMS Training PA and the ICRMP. The locations of all historic properties, sacred sites,  
32 and traditional cultural properties would be marked on training plans as “Restricted” and these  
33 areas would be avoided by training activities.

### 34 **S.10.8 Socioeconomics**

35 Under the No Action Alternative, there would be no changes to training levels or operations  
36 currently occurring at PCMS and no impacts to the socioeconomic environment, protection of  
37 children, or environmental justice populations would occur.

38 There would be a slight increase in economic activity under Proposed Action Alternatives 1A  
39 and 1B that would result in negligible beneficial impacts. The Proposed Action alternatives could  
40 result in a slight increase in the need for fire and emergency services. Overall socioeconomic  
41 impacts would be negligible.

### 42 **S.10.9 Traffic and Transportation**

43 No changes would result to traffic and transportation under the No Action Alternative and  
44 impacts to traffic and transportation would remain unchanged.

There would be no appreciable short-term effects to traffic or transportation resources from Proposed Action Alternative 1A; however, long-term minor adverse effects would be expected. Long-term effects would be primarily from increased roadway and rail traffic from transport of equipment and supplies during individual ABCT, Infantry (IBCT), and SBCT training events at PCMS. The use of new training tactics and equipment under Proposed Action Alternative 1B would also incrementally increase air and maneuver traffic at PCMS. Effects would be negligible as these activities, although slightly greater than existing conditions, would be essentially the same in size and nature as they pertain to traffic and transportation.

#### **S.10.10 Airspace**

Under the No Action Alternative, airspace over PCMS would remain unchanged with the greatest level of protection provided for military operations classified as the existing Piñon Canyon Military Operations Area (MOA). Without the protections provided by RA, there would be limitations as to the types of training that could occur at PCMS, making it less useful for real world scenario and force on force training employing the latest and emerging technologies. The overall impact of the No Action Alternative to airspace is minor.

Proposed Action Alternative 1A would result in individually negligible impacts to air space and a minor impact when BCT training activities are combined. Minor level of impacts could occur from the proposed airspace reclassification. The proposed RA would extend up to 10,000 feet above MSL, which could require re-routing traffic above 10,000 feet during activation.

There would be a minor impact on airspace use from aviation gunnery activities under Proposed Action Alternative 1B, relative to internal military traffic, as well as on PCMS assets and infrastructure located within the proposed surface danger zones. The use of flare tactics under Proposed Action Alternative 1B would have a minor impact to airspace use depending on if it were conducted within or outside RA and an active MOA. Also, use of electronic jamming systems could present a moderate adverse impact to training operations using radio frequency devices.

#### **S.10.11 Facilities and Utilities**

There would be minor impacts to facilities and utilities under the No Action Alternative and utilities needs would remain the same relative to existing conditions.

Under Proposed Action Alternative 1A, there would be minor short term increases in potable water consumption, as well as solid waste and wastewater generation, from increased Soldier density when training events occur at PCMS. No other impacts to utilities are anticipated. The new tactics and equipment analyzed under Proposed Action Alternative 1B would result in individually negligible impacts to facilities and utilities.

#### **S.10.12 Hazardous Materials, Hazardous Waste, and Toxic Substances**

Under the No Action Alternative, hazardous waste generation amounts and types would remain consistent with current conditions. Overall impacts to hazardous and toxic substances would be minor under the No Action Alternative.

Minor, short-term adverse impacts would be anticipated from Proposed Action Alternative 1A from the storage and use of hazardous materials and the generation of additional wastes during training events. Small amounts of hazardous materials would be used for maintaining individual and crew-served weapons, such as oil and lubricants, as well as weapons cleaning wipes/rags, absorbents/spill residue, small amounts of oils, antifreeze and batteries. There would be no anticipated change in hazardous waste generator and universal waste handler status as a result of the Proposed Action alternatives. Impacts from Proposed Action Alternative 1B would be negligible to minor.



#### **S.10.10 Summary of Environmental Effects**

Table S-1 presents a summary of the environmental consequences of the alternatives analyzed in this EIS. Table S-2 presents mitigation measures and best management practices (BMPs) associated with the Proposed Action alternatives. The proposed mitigation and BMPs were developed based on the analysis of potential resource impacts. These measures are proposed for implementation based on ability to be enacted, affordability, and the likelihood of effectiveness. Final decisions regarding adoption and implementation of proposed mitigation measures and BMPs will be made in the Army ROD. For the following resources, the potential adverse impacts would be negligible or minor and no mitigation would be required: air quality and greenhouse gases, cultural resources, socioeconomic, traffic and transportation, facilities and utilities, and hazardous materials, waste, and toxic substances. Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future.

**Table S-1. Summary of Adverse Environmental Effects**

|                                  | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |  |
|----------------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|--|
|                                  |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |  |
| Land Use                         |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Negligible                       |                       |                                |               |               |                                             | X                                | X               |                         | X                                      | X                                      |                              | X                        |                   |            |  |
| Minor                            | X                     |                                | X             | X             | X                                           |                                  |                 | X                       |                                        |                                        | X                            |                          |                   | X          |  |
| Moderate                         |                       | X                              |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |  |
| Significant                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Beneficial                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Air Quality and Greenhouse Gases |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Negligible                       |                       |                                |               |               | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        |                   |            |  |
| Minor                            | X                     | X                              | X             | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 | X          |  |
| Moderate                         |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Significant                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Beneficial                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Noise                            |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Negligible                       | X                     | X                              | X             | X             |                                             | X                                | X               |                         | X                                      | X                                      | X                            | X                        |                   |            |  |
| Minor                            |                       |                                |               |               | X                                           |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |
| Moderate                         |                       |                                |               |               |                                             |                                  |                 | X                       |                                        |                                        |                              |                          | X                 | X          |  |
| Significant                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |  |

**Table S-1. Summary of Adverse Environmental Effects**

|                             | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|-----------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                             |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Beneficial                  |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Geology and Soils</b>    |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                  |                       |                                |               |               |                                             | X                                | X               |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                       |                       |                                |               |               | X                                           |                                  |                 |                         |                                        |                                        |                              | X                        |                   |            |
| Moderate                    |                       |                                | X             |               |                                             |                                  |                 | X                       |                                        |                                        |                              |                          |                   | X          |
| Significant                 | X                     | X                              |               | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |
| Beneficial                  |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Water Resources</b>      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                  |                       |                                |               |               |                                             | X                                | X               |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                       | X                     |                                | X             |               | X                                           |                                  |                 | X                       |                                        |                                        |                              | X                        |                   |            |
| Moderate                    |                       | X                              |               | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   | X          |
| Significant                 |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |
| Beneficial                  |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Biological Resources</b> |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                  |                       |                                |               |               |                                             |                                  |                 |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                       |                       |                                | X             |               | X                                           | X                                |                 |                         |                                        |                                        |                              | X                        |                   |            |
| Moderate                    | X                     | X                              |               | X             |                                             |                                  | X               | X                       |                                        |                                        |                              |                          |                   | X          |

**Table S-1. Summary of Adverse Environmental Effects**

|                                   | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|-----------------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                                   |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Significant                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |
| Beneficial                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Cultural Resources</b>         |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                        |                       |                                | X             |               |                                             | X                                | X               |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                             | X                     | X                              |               | X             | X                                           |                                  |                 | X                       |                                        |                                        |                              | X                        | X                 | X          |
| Moderate                          |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Socioeconomics</b>             |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                        | X                     | X                              | X             | X             | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        | X                 | X          |
| Minor                             |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Moderate                          |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Traffic and Transportation</b> |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                        |                       |                                |               |               | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        |                   |            |
| Minor                             | X                     | X                              | X             | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 | X          |



**Table S-1. Summary of Adverse Environmental Effects**

|                                 | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|---------------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                                 |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Moderate                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                     |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Airspace</b>                 |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                      |                       | X                              | X             | X             |                                             |                                  |                 | X                       | X                                      | X                                      |                              | X                        | X <sup>1</sup>    |            |
| Minor                           | X                     |                                |               |               | X                                           |                                  | X               |                         |                                        |                                        | X                            |                          | X <sup>2</sup>    | X          |
| Moderate                        |                       |                                |               |               |                                             | X                                |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                     |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Facilities and Utilities</b> |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                      |                       |                                |               |               | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        |                   |            |
| Minor                           | X                     | X                              | X             | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 | X          |
| Moderate                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                     |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |

**Table S-1. Summary of Adverse Environmental Effects**

|                                                            | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> . |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|------------------------------------------------------------|-----------------------|--------------------------------|---------------|---------------|-----------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                                                            |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training     | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Hazardous Materials, Hazardous Waste, and Toxic Substances |                       |                                |               |               |                                               |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                                                 |                       |                                |               |               | X                                             | X                                | X               |                         | X                                      | X                                      | X                            | X                        |                   |            |
| Minor                                                      | X                     | X                              | X             | X             |                                               |                                  |                 | X                       |                                        |                                        |                              |                          | X                 | X          |
| Moderate                                                   |                       |                                |               |               |                                               |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                                                |                       |                                |               |               |                                               |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                                                 |                       |                                |               |               |                                               |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |

<sup>a</sup> Proposed Action Alternative 1B also includes the BCT training under Alternative 1A (see Sections 2.2.2 and 2.2.3).

Note: For cases where the impacts from the combined elements are different for Proposed Action Alternative 1A and Proposed Action Alternative 1B, the following convention is used to specify the difference: X<sup>1</sup> = Alternative 1A impacts; X<sup>2</sup> = Alternative 1B impacts.

**Table S-2. Additional Mitigation and Best Management Practices**

| Training Activity                       | Existing Operational Controls                                                                                                                                                                                                                                                                                                   | Proposed Additional Mitigation Measures and BMPs                  |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Land Use</b>                         |                                                                                                                                                                                                                                                                                                                                 |                                                                   |
| All                                     | <ul style="list-style-type: none"> <li>Mitigation through enhanced application of existing land management programs, including training land rotations, and LRAM land rehabilitation efforts, would be necessary to offset training impacts and maintain quality training lands for sustained military use.</li> </ul>          | <ul style="list-style-type: none"> <li>None identified</li> </ul> |
| <b>Air Quality and Greenhouse Gases</b> |                                                                                                                                                                                                                                                                                                                                 |                                                                   |
| All                                     | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future. Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul> |
| <b>Noise</b>                            |                                                                                                                                                                                                                                                                                                                                 |                                                                   |
| All                                     | <ul style="list-style-type: none"> <li>Compliance with applicable Federal, state, and local noise control regulations to avoid noise that exceeds acceptable sound levels.</li> </ul>                                                                                                                                           | <ul style="list-style-type: none"> <li>None identified</li> </ul> |

**Table S-2. Additional Mitigation and Best Management Practices**

| Training Activity        | Existing Operational Controls                                                                                                                                                                                                                                                                                                                                                             | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Geology and Soils</b> |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| ABCT and SBCT Training   | <ul style="list-style-type: none"> <li>Enhanced application of existing land management programs, training land rotations, and continued land rehabilitation efforts would be necessary to mitigate (restore) training impacts to soils and maintain quality training lands for sustained military use.</li> </ul>                                                                        | <ul style="list-style-type: none"> <li>As necessary, training activities could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain or snow event) following existing color code protocols to minimize soil impacts from vehicles.</li> </ul>                                                                                                                                                                                                               |
| All                      | <ul style="list-style-type: none"> <li>Training activities requiring the use of vehicles would continue to maximize use of existing trail networks to the greatest extent practicable to prevent damage to soils and trail proliferation.</li> </ul>                                                                                                                                      | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Water Resources</b>   |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| ABCT and SBCT Training   | <ul style="list-style-type: none"> <li>Enhanced application of existing land management programs, training land rotations, and continued land rehabilitation efforts would be necessary to offset training impacts and reduce the potential for sedimentation into surface waters, protecting water quality.</li> </ul>                                                                   | <ul style="list-style-type: none"> <li>Training activities could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain or snow event) following existing color code protocols to minimize soil rutting and erosion and indirect effects of sedimentation into adjacent surface waters.</li> <li>Additional measures could include establishing stormwater devices in strategic locations or bank stabilization projects to control sedimentation.</li> </ul> |
| All                      | <ul style="list-style-type: none"> <li>Training would continue to be done in compliance with Federal and State regulation, Army and Fort Carson Regulation, command policy, standing operating procedures, and multiple conservation programs and plans.</li> <li>Training activities requiring the use of vehicles would continue to maximize use of existing trail networks,</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                 |



**Table S-2. Additional Mitigation and Best Management Practices**

| Training Activity           | Existing Operational Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                                      |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             | including designated stream channel crossings, to the greatest extent practicable to reduce the potential for sedimentation.                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                       |
| <b>Biological Resources</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                       |
| ABCT and SBCT Training      | <ul style="list-style-type: none"> <li>Enhanced application of existing land management programs, training land rotations, and continued land rehabilitation efforts would be necessary to offset training impacts and maintain quality training lands for sustained military use.</li> </ul>                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>As necessary, training activities could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain or snow event) following existing color code protocols to minimize the impacts from rutting and vegetation loss.</li> </ul> |
| Survivability Training      | <ul style="list-style-type: none"> <li>During flare training, flares would only be deployed from altitudes of no less than 1,500 feet AGL to ensure that the flares extinguish prior to reaching the ground surface and avoiding the potential for wildland fire.</li> </ul>                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                     |
| Demolitions                 | <ul style="list-style-type: none"> <li>Blasting and other activities that produce extremely loud noises would be avoided within 0.5 miles (800 meters) of active golden eagle nests unless greater tolerance to the activity has been demonstrated by the golden eagles in the nesting area.</li> </ul>                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                     |
| All                         | <ul style="list-style-type: none"> <li>Training activities requiring the use of vehicles would continue to maximize use of existing trail networks to the greatest extent practicable to reduce impacts to vegetation and trail proliferation.</li> <li>Areas identified for land rehabilitation following training would be reseeded using an approved, site-specific native seed mix to reduce the potential for the establishment of invasive plant species.</li> <li>The Army would continue to limit potential adverse</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                     |

**Table S-2. Additional Mitigation and Best Management Practices**

| Training Activity         | Existing Operational Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                  |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | <p>impacts to sensitive, slow-moving species (i.e., lizards, etc.) by avoiding potential habitats to the extent practicable: only utilizing approved, established routes, and being observant while conducting maneuvers.</p> <ul style="list-style-type: none"> <li>• In accordance with the Bald and Golden Eagle Protection Act, the Army would continue to maintain buffers with a radius measuring 800-meters from surface up to 3,000 feet above ground level around any identified golden eagle nest until the young have fledged. These buffers would exclude all aircraft operations and foot traffic.</li> <li>• Off-road vehicle use within 800 meters of a golden eagle nest during the nesting season would continue to be avoided.</li> </ul>               |                                                                                                                                                                                                                                                                                   |
| <b>Cultural Resources</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                   |
| All                       | <ul style="list-style-type: none"> <li>• In accordance with the PCMS PA, all eligible sites and sites with unknown eligibility would be avoided during set up for proposed training activities and during the training activities themselves. Sites would be monitored to make sure they are intact, undisturbed, and not damaged during training exercises.</li> <li>• Native American sacred sites and properties of traditional and religious cultural importance would be managed and protected in accordance with the PCMS PA.</li> <li>• Native American sacred sites and properties of traditional and religious cultural importance on PCMS would also be avoided during set up for training activities and during the training activities themselves.</li> </ul> | <ul style="list-style-type: none"> <li>• Those Proposed Action alternatives which require Section 106 consultation include aviation gunnery and flare training, and demolition training. The other Proposed Action alternatives are addressed in the PCMS Training PA.</li> </ul> |

**Table S-2. Additional Mitigation and Best Management Practices**

| <b>Training Activity</b>          | <b>Existing Operational Controls</b>                                                                                                                                                                                                                                                                                            | <b>Proposed Additional Mitigation Measures and BMPs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Socioeconomics</b>             |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| All                               | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future.</li> </ul>                                                                                                                                    | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Traffic and Transportation</b> |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| All                               | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future. Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Airspace</b>                   |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| All                               | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future.</li> </ul>                                                                                                                                    | <ul style="list-style-type: none"> <li>Establishment of Raven Operational Zones (ROZs) at select areas throughout the range would allow for unencumbered operation and training on these airframes without fear of mid-air conflict or interruption due to incoming traffic. Since Ravens are not fitted with location devices, it is up to ground crews and aircraft operators to visually detect and avoid one another. Established ROZs would eliminate this need and allow for multiple consecutive activities.</li> <li>Establishment of flight paths around and through the range would help organize and control VFR traffic, thereby reducing the burden of separation on BAAF ATC. Single direction routes also help reduce the possibility of mid-air conflict, making all training activities safer.</li> </ul> |

**Table S-2. Additional Mitigation and Best Management Practices**

| Training Activity          | Existing Operational Controls                                                                                                                                    | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Electronic Jamming Systems | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>Electronic Warfare training zones should be established based specifically upon the effective range of each device utilized or the worst case scenario device to be used. This should be located a safe distance away from the RA boundary to protect non-participating aircraft and it should be identified on range maps as a permanent no fly-zone unless EW operations are sporadic. In those cases, a no-fly-zone can be established and published via NOTAM prior to activation.</li> </ul> |
| Laser Training             | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>To reduce the risk of laser usage to non-participating aircraft beyond established protocol, laser fire would be directed away from known airport approach patterns, particularly busy or nearby airports, including Pueblo Memorial Airport (PUB) and the Perry Stokes Airport (TAD).</li> </ul>                                                                                                                                                                                                 |
| Demolitions                | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>A ceiling should be established for defined demolition areas whereby limited blast effects have a negligible effect to aircraft allowing for a reduction in the loss of navigable airspace within the RA during demo activities, as opposed to establishing a temporary flight restriction (no-fly-zone) over the area from surface up to the proposed RA ceiling of 10,000 feet above MSL.</li> </ul>                                                                                            |
| Cumulative                 | <ul style="list-style-type: none"> <li>Range Operations would provide oversight and scheduling to deconflict what could be a very congested airspace.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

**Table S-2. Additional Mitigation and Best Management Practices**

| Training Activity                                                 | Existing Operational Controls                                                                                                                                                                 | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Facilities and Utilities</b>                                   |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                       |
| All                                                               | <ul style="list-style-type: none"> <li>Adherence to existing Installation management plans would guide Proposed Action activities, as it does for current training and operations.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                     |
| <b>Hazardous Materials, Hazardous Waste, and Toxic Substances</b> |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                       |
| All                                                               | <ul style="list-style-type: none"> <li>Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations.</li> </ul>          | <ul style="list-style-type: none"> <li>Inert non dud-producing 2.75-inch training rounds would be removed in accordance with TM 60A 1-1-22, EOD Procedures/General EOD Safety Procedures, and TM 60A 1-1-31 EOD Procedures/General Information on EOD Disposal Procedures.</li> </ul> |

AGL=above ground level; ATC=air traffic control; BAAF=Butts Army Airfield; DZ=drop zone; EOD=explosive ordnance disposal; FC Reg=Fort Carson Regulation; LRAM=Land Rehabilitation and Maintenance; LZ=landing zone; MSL=mean sea level; NEPA=National Environmental Policy Act; NOTAM=Notices to Airmen; PA=Programmatic Agreement; PCMS= Piñon Canyon Maneuver Site; PUB=Pueblo Memorial Airport; RA=restricted area (air space); ROZ=Raven Operational Zone; SARs=Species at Risk; TAD=Perry Stokes Airfield; TM=Training Manual; UAS=unmanned aerial system; VFR=visual flight rules

1

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1 **Piñon Canyon Maneuver Site (PCMS)**  
2 **Training and Operations**  
3 **Draft**  
4 **Environmental Impact Statement**

(placeholder)

Approved By:

5  
6 \_\_\_\_\_  
7 MG Paul J. LaCamera  
8 Division Commander  
9 4th Infantry Division  
10

Date: \_\_\_\_\_

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## EIS Table of Contents

|    |         |                                                                                                                                                                                                                                                                                                 |      |
|----|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1  | 1       | Purpose and Need for the Proposed Action .....                                                                                                                                                                                                                                                  | 1-1  |
| 2  | 1.1     | Introduction and Maneuver Site Setting .....                                                                                                                                                                                                                                                    | 1-1  |
| 3  | 1.2     | Purpose .....                                                                                                                                                                                                                                                                                   | 1-2  |
| 4  | 1.3     | Need .....                                                                                                                                                                                                                                                                                      | 1-2  |
| 5  | 1.3.1   | Brigade Combat Teams .....                                                                                                                                                                                                                                                                      | 1-4  |
| 6  | 1.3.2   | Aviation Gunnery (non-explosive) and Flare Training.....                                                                                                                                                                                                                                        | 1-4  |
| 7  | 1.3.3   | Electronic Jamming Systems .....                                                                                                                                                                                                                                                                | 1-5  |
| 8  | 1.3.4   | Laser Targeting.....                                                                                                                                                                                                                                                                            | 1-5  |
| 9  | 1.3.5   | Demolitions Training .....                                                                                                                                                                                                                                                                      | 1-5  |
| 10 | 1.3.6   | Unmanned Aerial Systems Training .....                                                                                                                                                                                                                                                          | 1-6  |
| 11 | 1.3.7   | Unmanned Ground Vehicle Training .....                                                                                                                                                                                                                                                          | 1-6  |
| 12 | 1.3.8   | Airspace Reclassification .....                                                                                                                                                                                                                                                                 | 1-6  |
| 13 | 1.3.9   | Drop Zone Development.....                                                                                                                                                                                                                                                                      | 1-6  |
| 14 | 1.4     | Decision to be Made .....                                                                                                                                                                                                                                                                       | 1-7  |
| 15 | 1.5     | Scope of Analysis .....                                                                                                                                                                                                                                                                         | 1-7  |
| 16 | 1.6     | Background and Related Environmental Documentation .....                                                                                                                                                                                                                                        | 1-7  |
| 17 | 1.6.1   | Repeal of PCMS Land Acquisition Waiver .....                                                                                                                                                                                                                                                    | 1-9  |
| 18 | 1.6.2   | Other Relevant Related Documents.....                                                                                                                                                                                                                                                           | 1-9  |
| 19 | 1.6.2.1 | Fort Carson and PCMS Integrated Natural Resources Management Plan .....                                                                                                                                                                                                                         | 1-9  |
| 20 | 1.6.2.2 | Fort Carson Fugitive Dust Control Plan .....                                                                                                                                                                                                                                                    | 1-9  |
| 21 | 1.6.2.3 | PCMS Stormwater Management Plan .....                                                                                                                                                                                                                                                           | 1-9  |
| 22 | 1.6.2.4 | Fort Carson Installation Operational Noise Management Plan .....                                                                                                                                                                                                                                | 1-9  |
| 23 | 1.6.2.5 | Programmatic Agreement Among U.S. Army Garrison Fort Carson, Colorado<br>State Historic Preservation Officer, and the Advisory Council on Historic Preservation<br>Regarding Military Training and Operational Support Activities at Piñon Canyon<br>Maneuver Site, Fort Carson, Colorado ..... | 1-10 |
| 24 | 1.7     | Public and Agency Involvement .....                                                                                                                                                                                                                                                             | 1-10 |
| 25 | 1.7.1   | Cooperating Agencies.....                                                                                                                                                                                                                                                                       | 1-10 |
| 26 | 1.7.2   | Agencies and Tribal Coordination .....                                                                                                                                                                                                                                                          | 1-12 |
| 27 | 1.7.3   | Scoping Period Summary .....                                                                                                                                                                                                                                                                    | 1-13 |
| 28 | 1.7.4   | Draft EIS Public Comment Period.....                                                                                                                                                                                                                                                            | 1-13 |
| 29 | 1.8     | Regulatory Framework.....                                                                                                                                                                                                                                                                       | 1-14 |

|    |         |                                                                              |      |
|----|---------|------------------------------------------------------------------------------|------|
| 1  | 2       | Description of the Proposed Action and Alternatives.....                     | 2-1  |
| 2  | 2.1     | Screening Criteria .....                                                     | 2-1  |
| 3  | 2.2     | Alternatives Considered.....                                                 | 2-1  |
| 4  | 2.2.1   | No Action Alternative – Continue Existing Mission and Training Operations at |      |
| 5  |         | the PCMS .....                                                               | 2-1  |
| 6  | 2.2.1.1 | Force Structure .....                                                        | 2-3  |
| 7  | 2.2.1.2 | Equipment.....                                                               | 2-3  |
| 8  | 2.2.1.3 | Construction and Operation.....                                              | 2-7  |
| 9  | 2.2.1.4 | Training Needs.....                                                          | 2-7  |
| 10 | 2.2.1.5 | Description of Training Activities.....                                      | 2-7  |
| 11 | 2.2.2   | Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver      |      |
| 12 |         | Impacts Measurement.....                                                     | 2-7  |
| 13 | 2.2.2.1 | SMA and Total Task Miles.....                                                | 2-8  |
| 14 | 2.2.2.2 | Armor Brigade Combat Team Training .....                                     | 2-14 |
| 15 | 2.2.2.3 | Infantry Brigade Combat Team Training.....                                   | 2-19 |
| 16 | 2.2.2.4 | Stryker Brigade Combat Team Training .....                                   | 2-25 |
| 17 | 2.2.3   | Proposed Action Alternative 1B – Enhanced Readiness Training Using New       |      |
| 18 |         | Tactics and Equipment at PCMS .....                                          | 2-28 |
| 19 | 2.2.3.1 | Aviation Gunnery (non-explosive) and Flare Training .....                    | 2-28 |
| 20 | 2.2.3.2 | Electronic Jamming Systems .....                                             | 2-31 |
| 21 | 2.2.3.3 | Laser Targeting .....                                                        | 2-31 |
| 22 | 2.2.3.4 | Demolitions Training.....                                                    | 2-31 |
| 23 | 2.2.3.5 | Unmanned Aerial Systems Training .....                                       | 2-32 |
| 24 | 2.2.3.6 | Unmanned Ground Vehicle Training .....                                       | 2-32 |
| 25 | 2.2.3.7 | Airspace Reclassification.....                                               | 2-33 |
| 26 | 2.2.3.8 | Drop Zone Development .....                                                  | 2-35 |
| 27 | 2.3     | Alternatives Considered and Eliminated from Detailed Study.....              | 2-35 |
| 28 | 2.4     | Preferred Alternative .....                                                  | 2-36 |
| 29 | 2.5     | Existing PCMS Training Protocol and Range Management .....                   | 2-36 |
| 30 | 2.5.1   | Scheduling of Training Activities .....                                      | 2-36 |
| 31 | 2.5.1.1 | Coordination Considerations .....                                            | 2-37 |
| 32 | 2.5.1.2 | Evaluation and Rotation of Training Areas .....                              | 2-37 |
| 33 | 2.5.2   | Protection of PCMS Resources .....                                           | 2-38 |

|    |         |                                                                                                               |        |
|----|---------|---------------------------------------------------------------------------------------------------------------|--------|
| 1  | 2.5.2.1 | FC Reg 200-1.....                                                                                             | 2-39   |
| 2  | 2.5.2.2 | FC Regulation 350-4 .....                                                                                     | 2-40   |
| 3  | 2.5.2.3 | FC Reg 350-10.....                                                                                            | 2-41   |
| 4  | 2.5.3   | Restoration and Rehabilitation of PCMS Training Lands.....                                                    | 2-42   |
| 5  | 2.5.3.1 | Maneuver Impact Miles .....                                                                                   | 2-42   |
| 6  | 2.5.3.2 | Recent Restoration and Rehabilitation at PCMS .....                                                           | 2-43   |
| 7  | 3       | Affected Environment and Environmental Consequences.....                                                      | 3-1    |
| 8  | 3.1     | Impact Assessment Methodology .....                                                                           | 3-1    |
| 9  | 3.1.1   | Description of Data Sources .....                                                                             | 3-1    |
| 10 | 3.1.2   | Approach for Analyzing Impacts.....                                                                           | 3-1    |
| 11 | 3.2     | Land Use .....                                                                                                | 3.2-1  |
| 12 | 3.2.1   | Affected Environment.....                                                                                     | 3.2-1  |
| 13 | 3.2.1.1 | Overview .....                                                                                                | 3.2-1  |
| 14 | 3.2.1.2 | Land Use on PCMS.....                                                                                         | 3.2-1  |
| 15 | 3.2.1.3 | Land Use Planning.....                                                                                        | 3.2-4  |
| 16 | 3.2.1.4 | Maneuver Damage Control Program.....                                                                          | 3.2-5  |
| 17 | 3.2.1.5 | Recreation.....                                                                                               | 3.2-5  |
| 18 | 3.2.1.6 | Regional Land Use.....                                                                                        | 3.2-6  |
| 19 | 3.2.1.7 | Aesthetics .....                                                                                              | 3.2-7  |
| 20 | 3.2.2   | Environmental Consequences .....                                                                              | 3.2-7  |
| 21 | 3.2.2.1 | No Action Alternative – Continue Existing Mission and Training Operations<br>at PCMS.....                     | 3.2-8  |
| 22 | 3.2.2.2 | Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver<br>Impacts Measurement .....          | 3.2-9  |
| 23 | 3.2.2.3 | Proposed Action Alternative 1B – Enhanced Readiness Training Using New<br>Tactics and Equipment at PCMS ..... | 3.2-10 |
| 24 | 3.2.3   | Mitigation Measures.....                                                                                      | 3.2-12 |
| 25 | 3.3     | Air Quality and Greenhouse Gases.....                                                                         | 3.3-1  |
| 26 | 3.3.1   | Affected Environment.....                                                                                     | 3.3-1  |
| 27 | 3.3.1   | Affected Environment .....                                                                                    | 3.3-1  |
| 28 | 3.3.1.1 | National Ambient Air Quality Standards and Attainment Status .....                                            | 3.3-1  |
| 29 | 3.3.1.2 | Installation-Wide Emissions.....                                                                              | 3.3-2  |
| 30 | 3.3.1.3 | Class I Areas.....                                                                                            | 3.3-3  |
| 31 | 3.3.1.4 | Climate and Greenhouse Gases .....                                                                            | 3.3-5  |

|    |         |                                                                           |        |
|----|---------|---------------------------------------------------------------------------|--------|
| 1  | 3.3.2   | Environmental Consequences.....                                           | 3.3-5  |
| 2  | 3.3.2.1 | No Action Alternative – Continue Existing Mission and Training Operations |        |
| 3  |         | at PCMS.....                                                              | 3.3-6  |
| 4  | 3.3.2.2 | Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |        |
| 5  |         | Impacts Measurement .....                                                 | 3.3-6  |
| 6  | 3.3.2.3 | Proposed Action Alternative 1B – Enhanced Readiness Training Using New    |        |
| 7  |         | Tactics and Equipment at PCMS .....                                       | 3.3-9  |
| 8  | 3.3.3   | Mitigation Measures .....                                                 | 3.3-10 |
| 9  | 3.4     | Noise .....                                                               | 3.4-1  |
| 10 | 3.4.1   | Affected Environment.....                                                 | 3.4-1  |
| 11 | 3.4.1.1 | Noise Definitions and Regulatory Authority.....                           | 3.4-1  |
| 12 | 3.4.1.2 | Background Noise .....                                                    | 3.4-2  |
| 13 | 3.4.1.3 | Military Noise Environment and Land Use Compatibility.....                | 3.4-2  |
| 14 | 3.4.1.4 | Potential for Complaints Regarding Large-Caliber Weapons and Demolition   |        |
| 15 |         | Training Noise .....                                                      | 3.4-3  |
| 16 | 3.4.1.5 | PCMS Training Noise.....                                                  | 3.4-3  |
| 17 | 3.4.2   | Environmental Consequences .....                                          | 3.4-8  |
| 18 | 3.4.2.1 | No Action Alternative – Continue Existing Mission and Training Operations |        |
| 19 |         | at PCMS.....                                                              | 3.4-9  |
| 20 | 3.4.2.2 | Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |        |
| 21 |         | Impacts Measurement .....                                                 | 3.4-10 |
| 22 | 3.4.2.3 | Proposed Action Alternative 1B – Enhanced Readiness Training Using New    |        |
| 23 |         | Tactics and Equipment at PCMS .....                                       | 3.4-11 |
| 24 | 3.4.3   | Mitigation Measures .....                                                 | 3.4-16 |
| 25 | 3.5     | Geology and Soils.....                                                    | 3.5-1  |
| 26 | 3.5.1   | Affected Environment .....                                                | 3.5-1  |
| 27 | 3.5.1.1 | Geology.....                                                              | 3.5-1  |
| 28 | 3.5.1.2 | Soils .....                                                               | 3.5-10 |
| 29 | 3.5.2   | Environmental Consequences.....                                           | 3.5-27 |
| 30 | 3.5.2.1 | No Action Alternative – Continue Existing Mission and Training Operations |        |
| 31 |         | at PCMS.....                                                              | 3.5-29 |
| 32 | 3.5.2.2 | Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |        |
| 33 |         | Impacts Measurement .....                                                 | 3.5-29 |
| 34 | 3.5.2.3 | Proposed Action Alternative 1B – Enhanced Readiness Training Using New    |        |
| 35 |         | Tactics and Equipment at PCMS .....                                       | 3.5-33 |

|    |         |                                                                           |        |
|----|---------|---------------------------------------------------------------------------|--------|
| 1  | 3.5.3   | Mitigation Measures .....                                                 | 3.5-36 |
| 2  | 3.6     | Water Resources .....                                                     | 3.6-1  |
| 3  | 3.6.1   | Affected Environment.....                                                 | 3.6-1  |
| 4  | 3.6.1.1 | Surface Water (Watersheds) and Floodplains .....                          | 3.6-1  |
| 5  | 3.6.1.2 | Wetlands .....                                                            | 3.6-3  |
| 6  | 3.6.1.3 | Surface Water Quality .....                                               | 3.6-3  |
| 7  | 3.6.1.4 | Groundwater and Aquifers.....                                             | 3.6-16 |
| 8  | 3.6.2   | Environmental Consequences .....                                          | 3.6-16 |
| 9  | 3.6.2.1 | No Action Alternative – Continue Existing Mission and Training Operations |        |
| 10 |         | at PCMS.....                                                              | 3.6-17 |
| 11 | 3.6.2.2 | Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |        |
| 12 |         | Impact Measurement.....                                                   | 3.6-18 |
| 13 | 3.6.2.3 | Proposed Action Alternative 1B – Enhanced Readiness Training Using New    |        |
| 14 |         | Tactics and Equipment at PCMS .....                                       | 3.6-20 |
| 15 | 3.6.3   | Mitigation Measures.....                                                  | 3.6-23 |
| 16 | 3.7     | Biological Resources .....                                                | 3.7-1  |
| 17 | 3.7.1   | Affected Environment.....                                                 | 3.7-1  |
| 18 | 3.7.1.1 | Vegetation .....                                                          | 3.7-1  |
| 19 | 3.7.1.2 | Wildlife and Aquatic Life .....                                           | 3.7-4  |
| 20 | 3.7.1.3 | Protected Species .....                                                   | 3.7-4  |
| 21 | 3.7.1.4 | Fort Carson Natural Resources Management (including PCMS) .....           | 3.7-5  |
| 22 | 3.7.1.5 | Wildland Fires .....                                                      | 3.7-11 |
| 23 | 3.7.2   | Environmental Consequences .....                                          | 3.7-12 |
| 24 | 3.7.2.1 | No Action Alternative – Continue Existing Mission and Training Operations |        |
| 25 |         | at PCMS.....                                                              | 3.7-13 |
| 26 | 3.7.2.2 | Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |        |
| 27 |         | Impacts Measurement .....                                                 | 3.7-13 |
| 28 | 3.7.2.3 | Proposed Action Alternative 1B – Enhanced Readiness Training Using New    |        |
| 29 |         | Tactics and Equipment at PCMS .....                                       | 3.7-17 |
| 30 | 3.7.3   | Mitigation Measures.....                                                  | 3.7-21 |
| 31 | 3.8     | Cultural Resources .....                                                  | 3.8-1  |
| 32 | 3.8.1   | Affected Environment.....                                                 | 3.8-1  |
| 33 | 3.8.1.1 | Cultural Resources Identification and Evaluation.....                     | 3.8-1  |
| 34 | 3.8.1.2 | Cultural Sequences for PCMS.....                                          | 3.8-1  |

|    |                                                                                    |        |
|----|------------------------------------------------------------------------------------|--------|
| 1  | 3.8.1.3 Cultural Resources.....                                                    | 3.8-2  |
| 2  | 3.8.1.4 Cemeteries.....                                                            | 3.8-4  |
| 3  | 3.8.1.5 Protection and Monitoring of Cultural Resources.....                       | 3.8-4  |
| 4  | 3.8.2 Environmental Consequences .....                                             | 3.8-5  |
| 5  | 3.8.2.1 No Action Alternative – Continue Existing Mission and Training Operations  |        |
| 6  | at PCMS.....                                                                       | 3.8-6  |
| 7  | 3.8.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver    |        |
| 8  | Impacts Measurement .....                                                          | 3.8-6  |
| 9  | 3.8.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New     |        |
| 10 | Tactics and Equipment at PCMS .....                                                | 3.8-7  |
| 11 | 3.8.3 Mitigation Measures.....                                                     | 3.8-10 |
| 12 | 3.8.3.1 Archaeological Sites.....                                                  | 3.8-10 |
| 13 | 3.8.3.2 Native American Traditional Cultural Properties, Sacred Sites, and Other   |        |
| 14 | Properties of Traditional, Religious, and Cultural Importance .....                | 3.8-10 |
| 15 | 3.9 Socioeconomics.....                                                            | 3.9-1  |
| 16 | 3.9.1 Affected Environment.....                                                    | 3.9-1  |
| 17 | 3.9.1.1 Population and Housing .....                                               | 3.9-1  |
| 18 | 3.9.1.2 Environmental Justice and Protection of Children.....                      | 3.9-2  |
| 19 | 3.9.1.3 Community Services .....                                                   | 3.9-3  |
| 20 | 3.9.1.4 Economic Development and Employment .....                                  | 3.9-4  |
| 21 | 3.9.2 Environmental Consequences .....                                             | 3.9-6  |
| 22 | 3.9.2.1 No Action Alternative – Continue Existing Mission and Training Operations  |        |
| 23 | at PCMS.....                                                                       | 3.9-7  |
| 24 | 3.9.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver    |        |
| 25 | Impacts Measurement .....                                                          | 3.9-8  |
| 26 | 3.9.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New     |        |
| 27 | Tactics and Equipment at PCMS .....                                                | 3.9-8  |
| 28 | 3.9.3 Mitigation Measures.....                                                     | 3.9-8  |
| 29 | 3.10 Traffic and Transportation .....                                              | 3.10-1 |
| 30 | 3.10.1 Affected Environment.....                                                   | 3.10-1 |
| 31 | 3.10.1.1 Regional Transportation .....                                             | 3.10-1 |
| 32 | 3.10.2 Environmental Consequences .....                                            | 3.10-4 |
| 33 | 3.10.2.1 No Action Alternative – Continue Existing Mission and Training Operations |        |
| 34 | at PCMS.....                                                                       | 3.10-5 |

|    |                                                                                    |         |
|----|------------------------------------------------------------------------------------|---------|
| 1  | 3.10.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |         |
| 2  | Impacts Measurement .....                                                          | 3.10-6  |
| 3  | 3.10.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New    |         |
| 4  | Tactics and Equipment at PCMS .....                                                | 3.10-10 |
| 5  | 3.10.3 Mitigation Measures.....                                                    | 3.10-11 |
| 6  | 3.11 Airspace.....                                                                 | 3.11-1  |
| 7  | 3.11.1 Affected Environment.....                                                   | 3.11-1  |
| 8  | 3.11.1.1 Overview .....                                                            | 3.11-1  |
| 9  | 3.11.1.2 Airspace Components .....                                                 | 3.11-6  |
| 10 | 3.11.1.3 Airspace Use and Management .....                                         | 3.11-20 |
| 11 | 3.11.2 Environmental Consequences .....                                            | 3.11-20 |
| 12 | 3.11.2.1 No Action Alternative – Continue Mission and Training Operations at       |         |
| 13 | PCMS .....                                                                         | 3.11-21 |
| 14 | 3.11.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |         |
| 15 | Impact Measurement.....                                                            | 3.11-22 |
| 16 | 3.11.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New    |         |
| 17 | Tactics and Equipment at PCMS .....                                                | 3.11-22 |
| 18 | 3.11.3 Mitigation Measures.....                                                    | 3.11-27 |
| 19 | 3.12 Facilities and Utilities .....                                                | 3.12-1  |
| 20 | 3.12.1 Affected Environment.....                                                   | 3.12-1  |
| 21 | 3.12.1.1 Potable Water .....                                                       | 3.12-1  |
| 22 | 3.12.1.2 Wastewater .....                                                          | 3.12-2  |
| 23 | 3.12.1.3 Stormwater.....                                                           | 3.12-3  |
| 24 | 3.12.1.4 Solid Waste .....                                                         | 3.12-5  |
| 25 | 3.12.1.5 Energy, Heating, and Cooling.....                                         | 3.12-6  |
| 26 | 3.12.1.6 Communications .....                                                      | 3.12-6  |
| 27 | 3.12.2 Environmental Consequences .....                                            | 3.12-6  |
| 28 | 3.12.2.1 No Action Alternative – Continue Existing Mission and Training Operations |         |
| 29 | at PCMS.....                                                                       | 3.12-8  |
| 30 | 3.12.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver   |         |
| 31 | Impacts Measurement .....                                                          | 3.12-8  |
| 32 | 3.12.2.3 Proposed Action Alternative 1B - Enhanced Readiness Training Using New    |         |
| 33 | Tactics and Equipment at PCMS .....                                                | 3.12-10 |
| 34 | 3.12.3 Mitigation Measures.....                                                    | 3.12-12 |
| 35 | 3.13 Hazardous Materials, Hazardous Waste, and Toxic Substances .....              | 3.13-1  |

|    |          |                                                                             |        |
|----|----------|-----------------------------------------------------------------------------|--------|
| 1  | 3.13.1   | Affected Environment.....                                                   | 3.13-1 |
| 2  | 3.13.1.1 | Regulatory Background and Definitions.....                                  | 3.13-1 |
| 3  | 3.13.1.2 | Environmental Compliance and Management Plans .....                         | 3.13-1 |
| 4  | 3.13.1.3 | Hazardous Material Use .....                                                | 3.13-2 |
| 5  | 3.13.1.4 | Hazardous Waste Management .....                                            | 3.13-3 |
| 6  | 3.13.1.5 | Other Toxic Substances .....                                                | 3.13-3 |
| 7  | 3.13.1.6 | Existing Sites.....                                                         | 3.13-3 |
| 8  | 3.13.2   | Environmental Consequences .....                                            | 3.13-3 |
| 9  | 3.13.2.1 | No Action Alternative – Continue Existing Mission and Training Operations   |        |
| 10 |          | at PCMS.....                                                                | 3.13-4 |
| 11 | 3.13.2.2 | Proposed Action Alternative 1A – Reconfigured Brigade Maneuver Training and |        |
| 12 |          | Maneuver Impacts Measurement .....                                          | 3.13-5 |
| 13 | 3.13.2.3 | Proposed Action Alternative 1B – Enhanced Readiness Training Using New      |        |
| 14 |          | Tactics and Equipment at PCMS .....                                         | 3.13-6 |
| 15 | 3.13.3   | Mitigation Measures.....                                                    | 3.13-8 |
| 16 | 4        | Cumulative Impacts .....                                                    | 4-1    |
| 17 | 4.1      | Impacts Methodology .....                                                   | 4-1    |
| 18 | 4.2      | PCMS Location and Cumulative Impact Setting.....                            | 4-2    |
| 19 | 4.2.1    | PCMS Current and Ongoing Projects .....                                     | 4-2    |
| 20 | 4.2.2    | PCMS Reasonably Foreseeable Future Actions .....                            | 4-2    |
| 21 | 4.2.3    | Off-Post Projects.....                                                      | 4-3    |
| 22 | 4.2.4    | Draft Historic Vegetation and Soil Impact Studies .....                     | 4-4    |
| 23 | 4.3      | Cumulative Impacts .....                                                    | 4-5    |
| 24 | 4.3.1    | Land Use .....                                                              | 4-5    |
| 25 | 4.3.2    | Air Quality and Greenhouse Gases.....                                       | 4-5    |
| 26 | 4.3.3    | Noise .....                                                                 | 4-6    |
| 27 | 4.3.4    | Geology and Soils.....                                                      | 4-6    |
| 28 | 4.3.5    | Water Resources .....                                                       | 4-6    |
| 29 | 4.3.6    | Biological Resources .....                                                  | 4-7    |
| 30 | 4.3.7    | Cultural Resources .....                                                    | 4-7    |
| 31 | 4.3.8    | Socioeconomics.....                                                         | 4-7    |
| 32 | 4.3.9    | Traffic and Transportation.....                                             | 4-7    |
| 33 | 4.3.10   | Airspace.....                                                               | 4-8    |
| 34 | 4.3.11   | Facilities and Utilities .....                                              | 4-8    |



|    |                                                                                       |        |
|----|---------------------------------------------------------------------------------------|--------|
| 1  | 4.3.12 Hazardous Materials, Waste, and Toxic Substances .....                         | 4-8    |
| 2  | 5 Summary of Environmental Consequences and Proposed Mitigation .....                 | 5-1    |
| 3  | 5.1 Environmental Effects Summary .....                                               | 5-1    |
| 4  | 5.2 Proposed Mitigation Summary .....                                                 | 5-7    |
| 5  | 6 Acronyms.....                                                                       | 6-1    |
| 6  | 7 References .....                                                                    | 7-1    |
| 7  | 8 List of Preparers.....                                                              | 8-1    |
| 8  | <b>EIS Table of Figures</b>                                                           |        |
| 9  | Figure 1.1-1. PCMS Location Map .....                                                 | 1-1    |
| 10 | Figure 2.2-1. Example Equipment Used at or Assigned to Fort Carson and PCMS.....      | 2-6    |
| 11 | Figure 2.2-2. BCT Maneuver/Training Requirements (isolated events) .....              | 2-9    |
| 12 | Figure 2.2-3. BCT Maneuver/Training Area Requirements (flowing scenario) .....        | 2-9    |
| 13 | Figure 2.2-4. Battalion Training Task Lane example at PCMS .....                      | 2-10   |
| 14 | Figure 2.2-5. Brigade Training Event Example at PCMS .....                            | 2-11   |
| 15 | Figure 2.2-6. 2013 2nd ABCT, 4th ID's Battalion Task Lanes at PCMS .....              | 2-15   |
| 16 | Figure 2.2-7. 2013 2nd ABCT, 4th ID's Brigade Task Lanes at PCMS .....                | 2-16   |
| 17 | Figure 2.2-8. Representative Example Training Concept Graphic for IBCT-Level Training |        |
| 18 | at Fort Carson.....                                                                   | 2-24   |
| 19 | Figure 2.2-9. Proposed New Aviation Gunnery Surface Danger Zones and Drop Zones.....  | 2-30   |
| 20 | Figure 2.2-10. Unmanned Ground Vehicle .....                                          | 2-33   |
| 21 | Figure 2.2-11. Sectional Depicting Proposed Restricted Area Relative to PCMS .....    | 2-34   |
| 22 | Figure 2.5-1. Description of Maneuver Impact Miles (MIMs).....                        | 2-43   |
| 23 | Figure 2.5-2. Heavily Churned Soil Following a Training Event (March 2013) .....      | 2-44   |
| 24 | Figure 2.5-3. Site During Rehabilitation (October 2013).....                          | 2-44   |
| 25 | Figure 2.5-4. Continuing Site Recovery (May 2014) .....                               | 2-44   |
| 26 | Figure 2.5-5. Continuing Site Recovery (July 2014) .....                              | 2-44   |
| 27 | Figure 3.2-1. Land Use at PCMS .....                                                  | 3.2-3  |
| 28 | Figure 3.3-1. Class I Areas within 200 miles of PCMS .....                            | 3.3-4  |
| 29 | Figure 3.4-1. PCMS Combined Small Caliber Weapons Noise Contours .....                | 3.4-4  |
| 30 | Figure 3.4-2. PCMS Drop Zones, Landing Zones and Combat Landing Strips .....          | 3.4-6  |
| 31 | Figure 3.4-3. Aerial Gunnery and Demolition Noise Contours (CDNL) .....               | 3.4-12 |
| 32 | Figure 3.4-4. Aerial Gunnery Complaint Risk Noise Contours (dBP) .....                | 3.4-13 |
| 33 | Figure 3.4-5. Breach Sites Complaint Risk Noise Contours (dBP).....                   | 3.4-14 |
| 34 | Figure 3.5-1. PCMS Formation Lithology and Geologic Age .....                         | 3.5-2  |
| 35 | Figure 3.5-2. Erosion Factor T and Accelerated Classes .....                          | 3.5-19 |
| 36 | Figure 3.5-3. Erosion Factor K and Erodibility Groups.....                            | 3.5-21 |
| 37 | Figure 3.5-4. Hydrologic Groups and Slope Class.....                                  | 3.5-23 |
| 38 | Figure 3.6-1. Water Resources at PCMS .....                                           | 3.6-2  |
| 39 | Figure 3.7-1. General Vegetation Communities at PCMS .....                            | 3.7-3  |
| 40 | Figure 3.7-2. Siebert Stakes.....                                                     | 3.7-16 |

|    |                                                                        |         |
|----|------------------------------------------------------------------------|---------|
| 1  | Figure 3.10-1. Convoy Route from Fort Carson to PCMS .....             | 3.10-2  |
| 2  | Figure 3.10-2. Existing PCMS Road Network.....                         | 3.10-3  |
| 3  | Figure 3.11-1. PCMS Sectional of the ROI Showing the Proposed RA ..... | 3.11-3  |
| 4  | Figure 3.11-2. PCMS Airspace Classification Diagram.....               | 3.11-4  |
| 5  | Figure 3.11-3. PCMS Airspace Vertical Diagram of the ROI.....          | 3.11-5  |
| 6  | Figure 3.11-4. PCMS LZs and Helipads.....                              | 3.11-8  |
| 7  | Figure 3.11-5. PCMS DZs.....                                           | 3.11-10 |
| 8  | Figure 3.11-6. PCMS Ranges .....                                       | 3.11-11 |
| 9  | Figure 3.11-7. PCMS UAS Flight Areas .....                             | 3.11-14 |
| 10 | Figure 3.11-8. ROI Airways and Military Routes.....                    | 3.11-17 |
| 11 | Figure 3.11-9. Airfields within the ROI.....                           | 3.11-19 |
| 12 | Figure 3.11-10. PCMS Ranges & Proposed Restricted Airspace .....       | 3.11-23 |

## 13 EIS Table of Tables

|    |                                                                                                |        |
|----|------------------------------------------------------------------------------------------------|--------|
| 14 | Table 1.7-1. FAA Order 1050.1, Impact Categories to be Considered.....                         | 1-11   |
| 15 | Table 2.2-1. Summary Comparison of Brigade Training Periods Relative to the 1980 EIS and       |        |
| 16 | Proposed Action Alternatives at PCMS .....                                                     | 2-2    |
| 17 | Table 2.2-2. Example Equipment Assigned to Fort Carson Units .....                             | 2-4    |
| 18 | Table 2.2-3. Standard Maneuver Area Requirements for the 3ABCT .....                           | 2-12   |
| 19 | Table 2.2-4. SMA and Total Task Miles for the 2nd Armored Brigade, 4th ID (2/4ABCT) .....      | 2-17   |
| 20 | Table 2.2-5. SMA Requirements for the 4th Infantry Brigade, 4th ID (4/4IBCT).....              | 2-20   |
| 21 | Table 2.2-6. Historical IBCT Training Event Occurring at Fort Carson to Train Lethal Companies |        |
| 22 | in Full Spectrum Combat Operations, July 19 – August 13, 2011.....                             | 2-23   |
| 23 | Table 2.2-7. SMA Requirements for the 1st Stryker Brigade, 4th ID (1SBCT) .....                | 2-25   |
| 24 | Table 3.1-1. Thresholds of Significance and Region of Influence .....                          | 3.1-3  |
| 25 | Table 3.2-1. Land Use Acreages at the PCMS.....                                                | 3.2-1  |
| 26 | Table 3.2-2. Summary of Land Use Impacts .....                                                 | 3.2-7  |
| 27 | Table 3.3-1. Air Quality Standards and Monitored Data .....                                    | 3.3-1  |
| 28 | Table 3.3-2. Maximum Annual Emissions at PCMS for All Activities .....                         | 3.3-2  |
| 29 | Table 3.3-3. Maximum Daily Emissions from ABCT Maneuvers - Existing Conditions.....            | 3.3-3  |
| 30 | Table 3.3-4. Summary of Air Quality and GHG Impacts .....                                      | 3.3-5  |
| 31 | Table 3.3-5. Maximum Daily Emissions from ABCT Maneuvers - Alternative 1A.....                 | 3.3-7  |
| 32 | Table 3.4-1. Common Sounds and Their Levels .....                                              | 3.4-1  |
| 33 | Table 3.4-2. Noise Limits for Noise Zones.....                                                 | 3.4-2  |
| 34 | Table 3.4-3. Risk of Noise Complaints by Level of Noise .....                                  | 3.4-3  |
| 35 | Table 3.4-4. Predicted Peak Noise Levels for Typical Army Simulators .....                     | 3.4-5  |
| 36 | Table 3.4-5. Calculated Noise Levels for Aircraft at PCMS .....                                | 3.4-7  |
| 37 | Table 3.4-6. Percentage of Population Highly Annoyed from Aircraft Noise .....                 | 3.4-7  |
| 38 | Table 3.4-7. Maximum Sound Levels for Army Tactical Vehicles .....                             | 3.4-8  |
| 39 | Table 3.4-8. Summary of Noise Impacts .....                                                    | 3.4-9  |
| 40 | Table 3.4-9. Maximum Sound Level in UASs .....                                                 | 3.4-15 |
| 41 | Table 3.5-1. Relationship between Soil Formation and Landform .....                            | 3.5-4  |
| 42 | Table 3.5-2. PCMS Soils Characteristics and Extent.....                                        | 3.5-11 |

|    |                                                                                                                 |         |
|----|-----------------------------------------------------------------------------------------------------------------|---------|
| 1  | Table 3.5-3. Erodibility of Soils on PCMS.....                                                                  | 3.5-17  |
| 2  | Table 3.5-4. Summary of Geology and Soils Impacts.....                                                          | 3.5-27  |
| 3  | Table 3.5-5. Soil Erosion Parameters in Mechanized Training Areas.....                                          | 3.5-30  |
| 4  | Table 3.5-6. Soil Erosion Parameters in Dismount-Only Training Areas.....                                       | 3.5-32  |
| 5  | Table 3.5-7. Soil Erosion Parameters in Proposed SDZs.....                                                      | 3.5-33  |
| 6  | Table 3.5-8. Soil Erosion Parameters within Potential Explosive Breach Sites.....                               | 3.5-34  |
| 7  | Table 3.5-9. Soil Erosion Parameters in Proposed DZs.....                                                       | 3.5-36  |
| 8  | Table 3.6-1. Stream Classifications and Water Quality Standards for Stream Segment 7<br>(Purgatoire River)..... | 3.6-4   |
| 10 | Table 3.6-2. Impaired Waterbodies at or near PCMS.....                                                          | 3.6-5   |
| 11 | Table 3.6-3. Stream Monitoring Gauge Stations in Proximity to PCMS.....                                         | 3.6-6   |
| 12 | Table 3.6-4. Water Quality Data for Stream Monitoring Stations near PCMS.....                                   | 3.6-9   |
| 13 | Table 3.6-5. USGS Water Quality Data in Proximity to PCMS by Decade.....                                        | 3.6-11  |
| 14 | Table 3.6-6. 1993 USGS Water Quality Data at Stations 07126300 and 07126485.....                                | 3.6-14  |
| 15 | Table 3.6-7. 1993 USGS Summary of Dissolved Solids and Suspended Sediment Loads in<br>Proximity to PCMS.....    | 3.6-15  |
| 17 | Table 3.6-8. 1993 USGS Study Instream Water Quality Data in Comparison to Water Quality<br>Standards.....       | 3.6-15  |
| 19 | Table 3.6-9. Summary of Water Resources Impacts.....                                                            | 3.6-17  |
| 20 | Table 3.6-10. Water Resources within Aviation Gunnery Training Areas.....                                       | 3.6-21  |
| 21 | Table 3.6-11. Water Resources within Proposed Breach Sites.....                                                 | 3.6-21  |
| 22 | Table 3.6-12. Water Resources within the Proposed DZs.....                                                      | 3.6-23  |
| 23 | Table 3.7-1. Fire Danger Classes at PCMS.....                                                                   | 3.7-12  |
| 24 | Table 3.7-2. Summary of Biological Resources Impacts.....                                                       | 3.7-12  |
| 25 | Table 3.7-3. PCMS Seed Mixes.....                                                                               | 3.7-17  |
| 26 | Table 3.8-1. Cultural Record of Southeastern Colorado.....                                                      | 3.8-2   |
| 27 | Table 3.8-2. PCMS Archaeological Sites based on 2014 GIS Data.....                                              | 3.8-3   |
| 28 | Table 3.8-3. Summary of Cultural Resource Impacts.....                                                          | 3.8-5   |
| 29 | Table 3.9-1. Population within the Region of Influence.....                                                     | 3.9-1   |
| 30 | Table 3.9-2. Housing Characteristics within the Region of Influence.....                                        | 3.9-2   |
| 31 | Table 3.9-3. Minority and Low-Income Population in the ROI.....                                                 | 3.9-3   |
| 32 | Table 3.9-4. Employment and Compensation by Industry in ROI.....                                                | 3.9-5   |
| 33 | Table 3.9-5. Summary of Socioeconomics Impacts.....                                                             | 3.9-7   |
| 34 | Table 3.10-1. Existing AADT and LOS on Nearby Roadways.....                                                     | 3.10-1  |
| 35 | Table 3.10-2. Summary of Traffic and Transportation Impacts.....                                                | 3.10-5  |
| 36 | Table 3.10-3. Estimated Number of Vehicles by Brigade.....                                                      | 3.10-6  |
| 37 | Table 3.10-4. LOS and Percent Increase in Traffic During ABCT Convoys.....                                      | 3.10-7  |
| 38 | Table 3.10-5. LOS and Percent Increase in Traffic During IBCT Convoys.....                                      | 3.10-8  |
| 39 | Table 3.10-6. LOS and Percent Increase in Traffic During SBCT Convoys.....                                      | 3.10-9  |
| 40 | Table 3.11-1. Summary of Airspace Impacts.....                                                                  | 3.11-21 |
| 41 | Table 3.12-1. Summary of PCMS Water Flow Rates.....                                                             | 3.12-2  |
| 42 | Table 3.12-2. Summary of Facilities and Utilities Impacts.....                                                  | 3.12-7  |
| 43 | Table 3.13-1. Summary of Hazardous Materials, Hazardous Waste, and Toxic Substances<br>Impacts.....             | 3.13-4  |

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|   |                                                                      |     |
|---|----------------------------------------------------------------------|-----|
| 1 | Table 5-1. Summary of Adverse Environmental Effects .....            | 5-2 |
| 2 | Table 5-2. Additional Mitigation and Best Management Practices ..... | 5-8 |
|   |                                                                      |     |
| 3 | <b>Appendices</b>                                                    |     |
| 4 | Appendix A – Notice of Intent                                        |     |
| 5 | Appendix B – Cultural Resources Supporting Documentation             |     |

# 1 Purpose and Need for the Proposed Action

## 1.1 Introduction and Maneuver Site Setting

The Piñon Canyon Maneuver Site (PCMS) is a military training site for Fort Carson, Colorado (Figure 1.1-1). PCMS is located near Trinidad, Colorado, approximately 150 miles southeast of Fort Carson, and consists of approximately 235,000 acres. It supports readiness training for units up to brigade size stationed at Fort Carson and for visiting Reserve and National Guard units, and its ranges and training lands are occasionally used by other Federal agencies and local civil authorities for low-impact training.

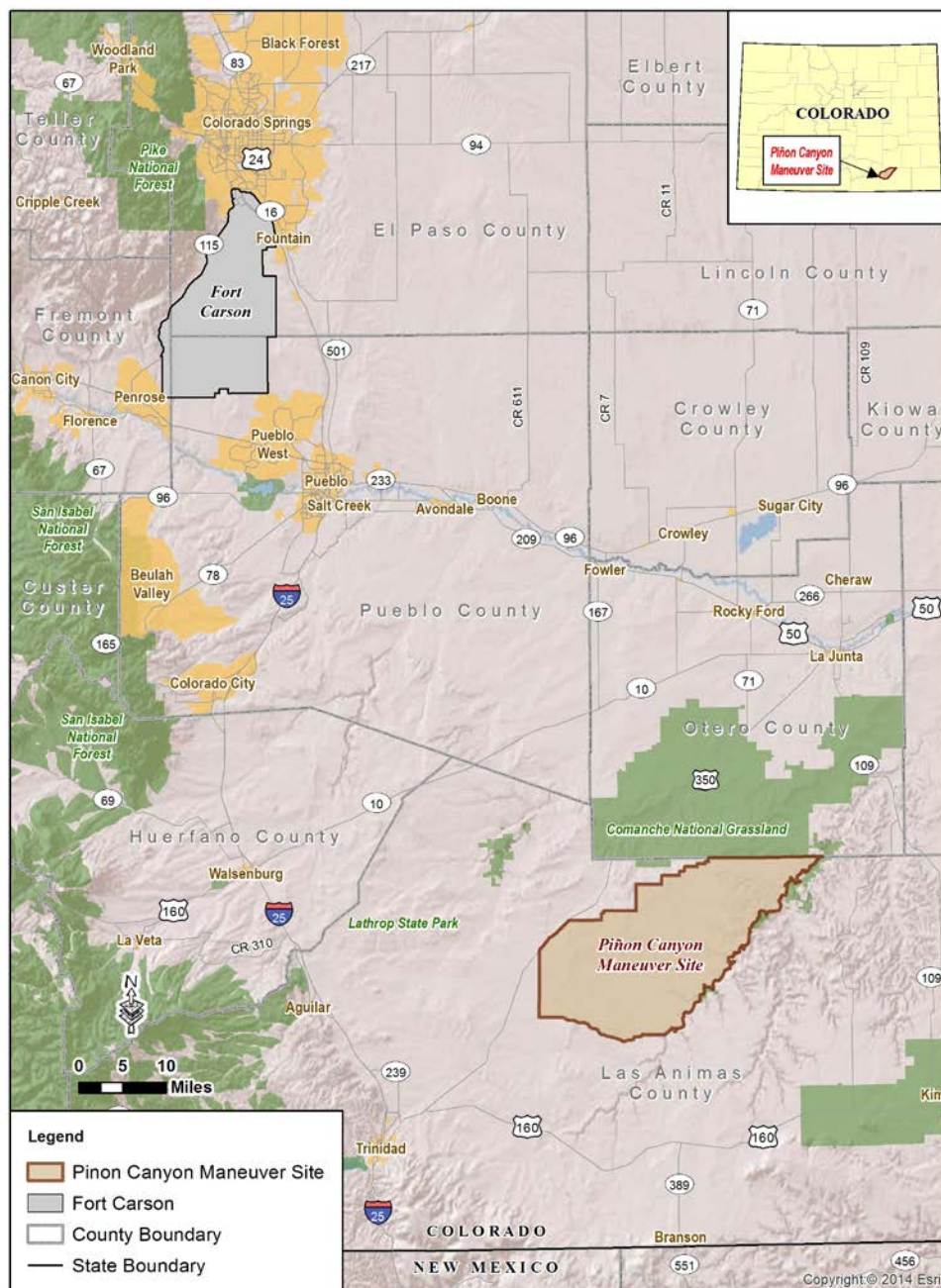


Figure 1.1-1. PCMS Location Map

The Department of Army (DA) is preparing an Environmental Impact Statement (EIS) to evaluate the environmental and socioeconomic impacts of proposed training and operation activities at PCMS. The National Environmental Policy Act of 1969 (NEPA) requires all Federal agencies to give appropriate consideration to potential environmental effects of proposed major actions in planning and decision-making. The Council on Environmental Quality (CEQ) is responsible for issuing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) implementing the provisions of NEPA. CEQ regulations in turn are supplemented by procedures adopted on an agency-specific basis. For the DA, the pertinent regulation is 32 CFR Part 651, *Environmental Analysis of Army Actions*. As the Federal Aviation Administration (FAA) is a cooperating agency for this action, this EIS has also been prepared in accordance with FAA Joint Order (JO) 7400.2K, effective April 3, 2014, *Procedures for Handling Airspace Matters*, and FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*.

The Army has prepared this Draft EIS to evaluate the potential impacts of actions that will enable future mission and training operations, involve the public, and inform decision-makers.

## 1.2 Purpose

The Proposed Action is to train Fort Carson's Brigade Combat Teams (BCTs) in full brigade-size exercises at PCMS. The action would also allow additional training opportunities, such as use of systems not previously used at PCMS, and the establishment of new training infrastructure or restricted areas, including new restricted airspace (Restricted Area) at PCMS. The Army also would integrate existing (but relatively new) land management and sustainability programs at PCMS with BCT training. Although this EIS would supersede the 1980 *Final Environmental Impact Statement for Training Land Acquisition* (1980 EIS), the training would not exceed the annual training duration established in that document. Maneuver training also would be entirely within the existing boundaries of PCMS (except for limited air and convoy operations) and does not require expansion of PCMS.

## 1.3 Need

The Army needs to conduct realistic and coordinated large scale training that integrates the ground and air resources of assigned and visiting units, including mechanized, infantry, support, and combat aviation assets. To accomplish this, the Army must maintain large maneuver and training areas of varying characteristics with complex terrain. Advances and changes in equipment and weapons systems and in their coordinated use require changes to the manner in which PCMS is internally configured and utilized.

Soldiers training on Fort Carson need to train together, in an integrated manner, during large-scale collective training events, involving a multitude of Military Occupational Specialties (MOSSs, which is the individual Soldiers' areas of expertise). The Army must train as it fights. Without the BCT-level training offered at PCMS, Fort Carson Soldiers would be forced to train in their specialties in isolation, and not in the integrated manner in which they would fight. For example, Soldiers trained on Fort Carson in the use of laser targeting systems may receive this training in piecemeal fashion, instead of practicing their skills along with other units in the manner in which they would actually employ them on the battlefield. The training areas and ranges available at Fort Carson are not sufficient for large-scale integrated training at the brigade-level. Soldiers training on Fort Carson also must compete for training availability against each other, meaning that they must use range capacity at Fort Carson that could be used by other Soldiers. If PCMS were not available, Fort Carson Soldiers would have to travel to Combat Training Centers to conduct high-quality, realistic, integrated brigade-level training. Training time at these centers is limited and should not be spent by Soldiers conducting a training mission there for the first time in a realistic and collective manner; rather Soldiers should



1 have already mastered their skills in a realistic manner at their home station. The Army must  
2 begin to take advantage of the larger space and greater training capacity of PCMS to allow Fort  
3 Carson units to train as they will fight during deployment, so that Soldiers are successful on the  
4 battlefield.

5 Brigade-level training is currently authorized under the 1980 EIS. The 1980 EIS for the PCMS  
6 Training Land Acquisition projected that the Piñon Site would allow from 4.4 to 4.7 brigade  
7 training periods, or months (generally referred to as “4.7 months” throughout this EIS), annually.  
8 The Final EIS defined a brigade training period to consist of a maximum of 5,085 personnel and  
9 approximately 826 wheeled and 432 tracked vehicles within a training area. It also included  
10 approximately 774 hours of helicopter support, and approximately 100 tactical support missions  
11 from the U.S. Air Force (USAF), which were to be spread throughout all training events  
12 annually.

13 Fort Carson's BCTs are approximately the same size as the brigades that were anticipated to  
14 train in 1980 (See Table 2.2-1). Although Fort Carson could continue to rely on the 1980 EIS to  
15 support its BCT training at PCMS, there are several reasons that suggest this would be a good  
16 time to prepare a new EIS that would supersede the 1980 EIS.

17 Although Fort Carson still plans to train brigade-size units at PCMS, the current BCTs have  
18 different equipment than was used in 1980. The BCTs recently changed configuration as well.

19 The Army announced on 25 June, 2013 that it was reducing the number of Active Army Brigade  
20 Combat Teams (BCTs) from 45 to 33 over the next several years<sup>1</sup>. At Fort Carson, this meant  
21 than an ABCT was inactivated and the three remaining BCTs (IBCT and two ABCTs) were  
22 augmented with a third maneuver battalion and other assets. It also resulted in the conversion  
23 of one ABCT to an SBCT at Fort Carson. Collectively, this decision reduced brigade-size units  
24 and Soldier populations on Fort Carson. Brigade-sized units decreased from seven to six and  
25 Soldier populations will decrease from approximately 26,593 to 24,051 by the end of FY15.

26 The Army continually adapts to changing conditions, and that means that Fort Carson units will  
27 continue to get new equipment and the structure of the BCTs will have further adjustments.  
28 Therefore, this EIS will transition from the broad characterization of maneuver training adopted  
29 in the 1980 FEIS, which described the upper training limits in terms of “vehicle days” and  
30 “brigade training periods” of approximately one month. The intensity of training periods will be  
31 expressed in terms of “Standard Maneuver Area” (SMA) and Total Task Miles, which will be  
32 scalable across platforms and training regimes. In terms of duration, the Army will continue to  
33 limit mechanized maneuver training to the historic and previously analyzed 4.7 months of  
34 current “brigade training periods”, as adjusted by the SMA value of BCT training activity. The  
35 Army also recognizes and will retain the historic temporal limit of 4.7 months of mechanized  
36 maneuver, independent of the SMA calculations in order to effectively rest and rotate the land  
37 and to enable our restorative programs.

38 Because of deployments to Iraq and Afghanistan, Fort Carson's BCTs have seldom had the  
39 opportunity to train at PCMS over the past decade. BCTs were in a cycle in which they would  
40 return from a deployment, replace and repair equipment and receive replacement Soldiers,  
41 rotate to a national training center such as Fort Irwin, and deploy again. In fact there have been  
42 only two BCT exercises at PCMS in the last five years. Now that overseas commitments have  
43 slowed, Fort Carson's BCTs will need to resume training at PCMS with greater frequency. For  
44 purposes of this EIS, it is assumed that BCTs would conduct at least one annual exercise at  
45 PCMS. Funding restrictions and additional deployments could mean that the exercises would  
46 occur more or less frequently, but all tracked and wheeled training, taken together, would not

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<sup>1</sup> Force structure as described will not be completely reorganized until June 2015.

1 exceed the SMA and Total Task Mile equivalent of 4.7 months of ABCT mechanized maneuver  
2 training.

3 PCMS is managed for recovery and sustainment under the programs described in Section 2.5,  
4 Existing PCMS Training Protocol and Range Management. This process represents a  
5 coordinated approach under which the condition of training areas is monitored and maintained.  
6 The development of this Draft EIS affords Fort Carson the opportunity to review its  
7 environmental program and the current state of the environment on PCMS, and decide how  
8 best to structure training events for the recently reconfigured BCTs and the SBCT.

9 With a new management regime and the potential for more training exercises than have  
10 occurred over the past several years, Fort Carson must integrate its resource and training  
11 actions. This is needed so that both realistic training and optimum resource management can  
12 occur.

13 Finally, Fort Carson needs to have the ability to make changes in training infrastructure and  
14 execute new training as discussed below. This is in part why this EIS will establish a new  
15 baseline. The need for conducting the identified additional training activities at PCMS is twofold.  
16 First, it would help relieve training congestion at Fort Carson. As the deployment cycle slows,  
17 and the number of Soldiers residing at Fort Carson increases (although the number assigned  
18 remains the same), competition among units for training time and space will sharply increase,  
19 and Fort Carson is not large enough to meet all such training requirements. Second,  
20 conducting these training events in conjunction with BCT training events makes the overall BCT  
21 training experience more realistic. This makes the unit more likely to succeed at national training  
22 centers and during their actual combat deployments.

23 These training events include non-explosive aviation gunnery and flare training, electronic  
24 jamming systems, laser target sighting, tactical demolitions, unmanned and unarmed aerial  
25 reconnaissance systems, and light unmanned ground vehicles (up to 500 pounds).

26 In terms of training infrastructure, PCMS needs to establish two new drop-zones (DZs) and  
27 restricted airspace directly over PCMS, up to 10,000 feet above mean sea level (MSL) during  
28 periods when training activity poses a hazard to aircraft. These changes (and similar  
29 unforeseen, future changes) are needed to make training more realistic and to avoid conflicts  
30 between training activities.

### 31 **1.3.1 Brigade Combat Teams**

32 There are three types of BCTs stationed and trained on Fort Carson. They include an ABCT,  
33 IBCT, and SBCT. Each of these BCTs requires the maneuver space at PCMS to adequately  
34 perform their wartime function. BCTs are modular organizations that provide the division, land  
35 component commander (LCC), or joint task force (JTF) commander with close combat  
36 capabilities. BCTs are designed for operations encompassing the entire spectrum of conflict.  
37 They fight battles and engagements by employing the tactical advantages of a combined arms  
38 force structure. BCTs accomplish their missions by integrating the actions of maneuver  
39 battalions, field artillery, aviation, engineering, air and missile defense, close air support, and  
40 naval gunfire. The BCT's reconnaissance squadron and automated information systems give it  
41 information superiority over threat forces. These assets enable the BCT to gather large amounts  
42 of information, process it rapidly into intelligence, and disseminate it to decision-makers quickly.

43 Training impacts associated with the current ABCT configuration are similar, but not exact, to  
44 those described in the 1980 EIS due to similarities in training duration, force structure, combined  
45 arms mix, and equipment density (see Table 2.2-1). Impacts associated with training of the  
46 IBCT and SBCT are also within the parameters established for BCT training in the 1980 EIS.



### **1.3.2 Aviation Gunnery (non-explosive) and Flare Training**

Aviation gunnery skills are in continual need of improvement. Aviation units often demonstrate difficulties with gunnery tasks, which indicate a lack of home-station gunnery training. Some of these difficulties include appropriate use of lasers, target tracking methods, and weapon system troubleshooting techniques. As a result of these trends, Army policy requires incorporating gunnery training into each flight that launches in order to facilitate attainment and sustainment of good gunnery skills. Therefore, aviation gunnery training opportunities at PCMS need to be increased while aviation units are training or otherwise providing maneuver support during combined arms exercises.

Flares are defensive mechanisms employed from military aircraft to avoid detection and/or attack by adversary air defense systems. Flares are magnesium pellets that, when ignited, burn for 3.5 to 5 seconds at 2,000 degrees Fahrenheit (°F). The burn temperature is hotter than the exhaust of an aircraft, and therefore, attracts and decoys heat-seeking weapons targeted on the aircraft.

Self-protection flares are used in combat to keep aircraft from being targeted by weapons such as surface-to-air missiles (SAMs), anti-aircraft artillery (AAA), and other aircraft. Flares are used in pilot training to develop the near instinctive reactions to a threat that are critical to combat survival.

### **1.3.3 Electronic Jamming Systems**

Electronic jamming systems help Soldiers defeat deadly improvised explosive devices (IEDs), by blocking radio signals that can be used by insurgents to detonate the devices remotely. For this reason, it is imperative that Soldiers are allowed to maximize training opportunities on these systems wherever they may be conducting training. These systems are used mostly on and around roads and trails where IEDs would be anticipated to be placed.

### **1.3.4 Laser Targeting**

Laser-equipped systems can estimate target distance as well as designate targets in daylight, at night, and in haze, smoke, fog, and rain. Laser range finders determine range to the target with a laser and calculate grid coordinates with built-in GPS, elevation, and azimuth sensing capability. Laser designators provide targeting for laser-guided missiles or precision artillery rounds. Laser training is needed to integrate and synchronize the various units and Soldiers involved in the designating and targeting process. For example, ground reconnaissance units use laser designation systems to identify targets for aviation units to acquire (lock onto) and destroy using laser guided munitions. Aviation and unmanned aerial system (UAS) units can also use lasers to designate targets to be neutralized by ground units. Lasers are routinely employed for these types of real-world scenarios in combat; however, integrated collective training at the home station on these systems does not occur to the extent desired and must be incorporated into as many training events as possible.

### **1.3.5 Demolitions Training**

BCTs and Special Operations Force (SOF) units use demolitions to perform breaching and other blow-in-place operations. Breaching operations are conducted to allow maneuvering despite the presence of obstacles. Breaching operations also use demolitions, such as Bangalore torpedoes, to clear paths through obstacles. Units may also use demolitions to penetrate through doors, walls, etc. and/or neutralize booby traps or simulated IEDs. Demolitions used to conduct these types of operations include C4, trinitrotoluene (TNT), plastic explosives, detonating cord, Bangalore torpedoes, blasting caps, timed fuses, and igniters. BCT maneuver battalions, combat engineers and SOF units must all be proficient with demolitions

use to effectively accomplish these operations in a combat environment. Therefore, demolitions training must be incorporated to the maximum extent possible during field training exercises.

### **1.3.6 Unmanned Aerial Systems Training**

The Army nominally increased the quantities of UASs stationed at Fort Carson by augmenting the Combat Aviation Brigade with an additional three Shadow Platoons under the Army Aviation Restructuring Initiative. Each additional platoon has four RQ-7 Shadow 200s, which collectively result in an increase of twelve on Fort Carson. The additional UAS platoons have the same training demands as the other Fort Carson UAS platoons that train at PCMS. The training of UAS units has been evaluated in previous analyses at PCMS.

UAS training operations support battlefield commanders and their staff as they plan, coordinate, and execute operations. UASs increase the situational awareness (SA) of commanders through intelligence, surveillance, and reconnaissance (ISR). Army UAS can perform some or all of the following functions: enhanced targeting through acquisition, detection, designation, and battle damage assessment (BDA). Other UAS missions support the maneuver commander by contributing to the effective tactical operations of smaller units.

### **1.3.7 Unmanned Ground Vehicle Training**

Over the past decade, the use of unmanned ground vehicles (UGVs) in theater has greatly increased, providing Soldiers with enhanced capabilities to safely conduct reconnaissance missions, route clearance, and threat defeat. As threats evolve and Soldiers prepare for missions in new areas of operation, advanced robotics technology is required. Soldiers use UGVs for reconnaissance and IED detection to defeat battlefield threats.

### **1.3.8 Airspace Reclassification**

Restricted area (RA)<sup>2</sup> provides Fort Carson with additional areas of operation for maneuvers. Fort Carson commanders could provide the same quality training experienced on Fort Carson R2601 to overflow rotational BCT units and the Opposing Force (OPFOR) units that are currently unable to train on Fort Carson due to the force-on-force maneuver area training shortage. RA is required to ensure a safe training environment and allow use of specific weapon systems and training enablers while being isolated from the public. It also facilitates air and ground maneuvers using advanced weapon systems, electronic jamming, lasers, flares, smoke, IED simulators, pyrotechnic activities, as well as multiple aerial fixed wing and rotary wing air-to-ground gunnery operations. Because of advances in weapon systems, modern forces are required to cover more ground in dispersed operation and operate over greater distances than in years past. Airspace reclassification is necessary to satisfy the training needs of the new air-ground combat systems and could be attained at PCMS if the restricted airspace request were approved. RA would meet the need to train Soldiers safely in the most realistic environment possible, isolated from the public by land and air.

### **1.3.9 Drop Zone Development**

Fort Carson has determined that two DZs are required at PCMS to allow for airborne operations to continue without training area conflict at Fort Carson and PCMS. DZs facilitate airborne operations. An airborne operation is an operation involving the air movement into an objective area of combat forces and their logistic support for the execution of a tactical, operational, or strategic mission. The means employed may be any combination of airborne units, air

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<sup>2</sup> 'Restricted area' in this context and the use of the acronym 'RA' refers to the airspace designation to be requested from the FAA. It is distinct from the 'restricted area' Fort Carson has designated in certain ground areas of PCMS as per FC Reg 350-10.

transportable units, and types of transport aircraft, depending on the mission and the overall situation.

## 1.4 Decision to be Made

This EIS process, to include the analyses, documentation, and comments received from the public and other stakeholders, provides the Army decision-maker with the information necessary to evaluate the environmental and socioeconomic impacts associated with the proposed alternatives. Information on potential impacts enables the Army to make a decision that is based on an understanding of environmental consequences and take action, as appropriate, to protect, restore, and enhance the environment. This process also provides a record of public, tribal, and agency input received on the Proposed Action, the environmental analysis presented in the Draft EIS, and how the Army considered that input during the process.

The decision being sought from this NEPA process is to inform the decision-maker of the potential for adverse effects from selecting of one of the proposed alternatives described in Chapter 2. The final decision and rationale for selection will be presented in a Record of Decision (ROD), which will be signed no earlier than 30 days from the publication of the Notice of Availability (NOA) of the Final EIS. The ROD will document the decision made, provide a supporting explanation, and identify mitigation measures. It will explain both the pertinent factors relied on in making a selected decision and how the final alternative meets the purpose and need. The ROD will also identify and adopt mitigation measures. Once the ROD is signed, the Army will place an NOA in the *Federal Register*, announcing the availability of the ROD for public review.

## 1.5 Scope of Analysis

This EIS identifies and evaluates the direct, indirect, and cumulative impacts associated with proposed changes to training at PCMS on environmental, cultural, and socioeconomic resources. This EIS pertains to training and operations within the existing PCMS. This EIS does not involve training at Fort Carson, nor does it involve expansion of PCMS (see Section 1.6.1, Repeal of PCMS Land Acquisition Waiver).

Descriptions of the affected environment and analyses of the potential impacts (direct and indirect) to physical, cultural, and biological resources are provided in Chapter 3. Cumulative impacts are discussed in Chapter 4. Impacts to the following valued environmental components (VECs) were identified as potential issues of concern during the internal Army scoping process and are analyzed in regards to each alternative, which includes the No Action Alternative:

- Land Use and Aesthetics
- Air Quality and Greenhouse Gases
- Noise
- Geology and Soils
- Water Resources
- Biological Resources
- Cultural Resources
- Socioeconomics
- Traffic and Transportation
- Airspace
- Facilities and Utilities
- Hazardous Materials, Hazardous Waste, and Toxic Substances

## 1.6 Background and Related Environmental Documentation

This section focuses on the history of NEPA compliance on PCMS that either directly impacted, or had the potential to tangentially impact, operations at PCMS. Since the Army's acquisition of PCMS, actions small and large have been analyzed under NEPA. Fort Carson's NEPA website,

<http://www.carson.army.mil/DPW/nepa.html>, lists a number of NEPA documents prepared for Fort Carson activities. The following summarizes the more comprehensive training, operations, and stationing actions:

- Fort Carson's 1980 *Final Environmental Impact Statement for Training Land Acquisition* (Fort Carson, 1980) covered the acquisition of what is today PCMS and included training operations up to certain levels. This EIS established a training limit for mechanized ground units of 4.7 months per year at PCMS.
- The 2007 *Final Piñon Canyon Maneuver Site Transformation Environmental Impact Statement* (CH2MHill, 2007) was intended to cover Army transformation operations and training (modernization of the then-new, modular Army), and would have included levels of training exceeding those covered by the original acquisition Final EIS. The Army was subsequently sued over this EIS, and the ROD was ultimately vacated by a Federal district court. The court determined among other things that the Army Final EIS ROD failed to describe and measure adequately the anticipated intensity and frequency of the additional training activities against reliable baseline data, and therefore, the assessment of training impacts and proposed mitigation measures did not support the conclusions and decision in the ROD.
- The 2009 *Final Environmental Impact Statement for Implementation of Fort Carson Grow the Army Stationing Decisions* (USAEC and Fort Carson, 2009) evaluated the stationing of an IBCT and combat support/combat service support Soldiers, and in March 2009, a ROD was signed that included a decision to increase the number of Soldiers stationed at Fort Carson (who also would train at PCMS).
- In January 2011, Fort Carson published a draft *Environmental Assessment for PCMS Transformation* which modified the approach to transformation and eliminated most of the previously proposed construction. This effort, however, was not further advanced, as newer proposals developed.
- In 2012, the *Fort Carson Combat Aviation Brigade Stationing Implementation Final Environmental Assessment and Finding of No Significant Impact* was completed. This EA stated: "The need for a more concrete estimate of anticipated training needs and the lack of objective, empirical data regarding the impact of any increase in mechanized maneuver training has resulted in the need to remain within previously established limits unless and until greater mechanized training needs, if any, can be distinctly quantified and environmental impacts can be reliably assessed. Should the Army later desire to propose to move beyond the historically established limits, then improved data collection in the near term will aid in any future NEPA analyses. The proposed use of PCMS by Combat Aviation Brigade units ... would not result in an increase of PCMS by mechanized ground units above the 4.7 months originally analyzed in 1980" (USAEC and Fort Carson, 2012).
- In January 2014, an Environmental Assessment was prepared and Finding of No Significant Impact (FNSI) issued in 2014 announcing the conversion of an ABCT to an SBCT at Fort Carson (USAEC and Fort Carson, 2014). Conversion of the 4<sup>th</sup> Infantry Division (4ID) BCTs includes the inactivation of one ABCT. Also, the current IBCT and the remaining ABCT are being reorganized as larger units through the addition of a maneuver battalion and the addition of an engineer company. The end result will be that the 4ID will go from having three ABCTs and one IBCT to a configuration consisting of one ABCT, one IBCT, and one SBCT. These conversions are expected to occur by the end of 2015. Implementation of the conversion will not result in any new construction,

but there may be some renovation of buildings and equipment storage areas over time at Fort Carson.

Soldier training occurred at PCMS as authorized in prior NEPA reviews, including the 1980 EIS and subsequent Environmental Assessments and FNSIs. This EIS provides a comprehensive NEPA review of Army training on PCMS, which includes an integrated analysis of training at PCMS for Fort Carson BCTs, described above, and the additional training activities and equipment detailed in Section 2.2.

### **1.6.1 Repeal of PCMS Land Acquisition Waiver**

The Assistant Secretary of the Army for Installations and Environment (ASA IE), Ms. Katherine Hammack, announced on November 25, 2013 that the Department of Defense (DoD) had repealed the 2007 land acquisition waiver for the Army to add more land to PCMS, thus eliminating the potential for expansion. The waiver would have been required in order for the Army to acquire additional land at PCMS due to a DoD-imposed moratorium on major land acquisitions by the military services.

### **1.6.2 Other Relevant Related Documents**

#### **1.6.2.1 Fort Carson and PCMS Integrated Natural Resources Management Plan**

The Integrated Natural Resources Management Plan (INRMP) guides the implementation of a natural resources program at Fort Carson and PCMS to ensure that the Installation complies with applicable environmental laws and regulations. The INRMP describes the procedures and best management practices (BMPs) used by Fort Carson to ensure that potential impacts to the environment from construction, training, and operational activities are reduced (Fort Carson, 2013a).

#### **1.6.2.2 Fort Carson Fugitive Dust Control Plan**

The Fort Carson Fugitive Dust Control Plan focuses on control measures to implement to minimize fugitive dust emissions and to avoid exceeding the threshold levels established by state regulations. The plan describes all of the fugitive dust sources and the technologically feasible and economically reasonable control measures and operating procedures that can be used to minimize dust on Fort Carson and PCMS. The plan also serves as a tool that can be incorporated into project design and construction phases to help reduce fugitive dust emissions on Fort Carson (Fort Carson, 2012a).

#### **1.6.2.3 PCMS Stormwater Management Plan**

The PCMS Stormwater Management Plan (SWMP) outlines management practices, control techniques, system designs, engineering methods, and other provisions appropriate for the control of pollutants in discharges from PCMS. This plan also includes the BMPs that can be implemented for stormwater quality and quantity control, including measurable goals for each of the BMPs (Fort Carson, 2012c).

#### **1.6.2.4 Fort Carson Installation Operational Noise Management Plan**

The Fort Carson Installation Operational Noise Management Plan (IONMP) provides Fort Carson with a methodology for analyzing exposure to noise and safety hazards associated with military operations at both Fort Carson and PCMS, and presents land use guidelines for achieving compatibility between the Army and surrounding communities. Elements of the plan include discussions of noise and vibration, mitigation techniques, noise abatement procedures, encroachment/training issues, recommendations for working with local communities, and noise modeling (USAPHC, 2012).

### **1.6.2.5 Programmatic Agreement Among U.S. Army Garrison Fort Carson, Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Military Training and Operational Support Activities at Piñon Canyon Maneuver Site, Fort Carson, Colorado**

This agreement outlines processes to ensure appropriate consideration of cultural resources in accordance with the National Historic Preservation Act of 1966 (NHPA) during military training at PCMS.

## **1.7 Public and Agency Involvement**

The Army invites public participation in the NEPA process. The perspectives, needs, interests, and data provided by interested persons promotes open communication and enables better decision-making. All agencies, organizations, and members of the public that have a potential interest in the Proposed Action are urged to participate in the decision-making process. Throughout this process, the public may obtain information on the status and progress of the Proposed Action and the EIS through the Fort Carson NEPA program at (719) 526-1852, Monday through Friday, 7:30 a.m. to 4:00 p.m. Mountain Standard Time; or by email to: [usarmy.carson.imcom-central.list.dpw-ed-nepa@mail.mil](mailto:usarmy.carson.imcom-central.list.dpw-ed-nepa@mail.mil).

Public participation opportunities with respect to the EIS and decision-making on the Proposed Action are guided by 32 CFR Part 651, *Environmental Analysis of Army Actions*. Early on in the preparation of the Draft EIS, two scoping sessions were conducted where the public was able to provide input to the Proposed Action. This Draft EIS is available and can be commented on for a 45-day. At the end of the 45-day period, the Army will consider all comments submitted by individuals, agencies, or organizations as it prepares the Final EIS. The Final EIS will be made available to the public for 30 days, after which time the Army will make and document its decision in a ROD and notify the public of the ROD availability.

### **1.7.1 Cooperating Agencies**

NEPA mandates that Federal agencies responsible for preparing NEPA analyses and documentation must do so “in cooperation with state and local governments and other concerned public and private organizations” and other agencies with jurisdiction by law or special expertise (42 U.S. Code [USC]. 4331[a] and 4332[c]). The CEQ regulations addressing cooperating agencies’ status (40 CFR 1501.6 and 1508.5) allow Federal agencies (as lead agencies) to invite tribal, state, and local governments, as well as other Federal agencies, to serve as cooperating agencies in the preparation of an EIS.

Because the Army’s Proposed Action involves the potential reclassification of special use airspace (SUA) over PCMS, the FAA has agreed to become a cooperating agency for this EIS.

FAA is responsible for managing navigable airspace for public safety and ensuring its efficient use for commercial air traffic, general aviation, and national defense, including SUA utilized by the DoD. FAA established several policies, including:

- Order 1050.1, Environmental Impacts: Policies and Procedures
- Order 7400.2, Procedures for Handling Airspace Matters

FAA Order 1050.1 provides the FAA with policies and procedures to ensure agency compliance with NEPA and implementing regulations issued by the CEQ (40 CFR Parts 1500-1508). Appendix A in FAA Order 1050.1 identifies 18 impact categories that should be considered during the NEPA process. This EIS considers each of the resources as prescribed by FAA Order 1050.1. The sections where each of these resources are discussed in this EIS, or the

rationale for excluding a detailed discussion of a specific resource, are provided in Table 1.7-1. FAA Order 7400.2, specifically Chapter 32, provides guidance to air traffic personnel to assist in applying the requirements in Order 1050.1E, "Environmental Impacts: Policies and Procedures," to air traffic actions.

To eliminate unnecessary duplication of effort between the FAA and DoD, a Memorandum of Understanding (MOU) between the FAA and DoD was signed on October 4, 2005 to "provide for the issuance of environmental documents for the development, designation, modification, and use of SUA" ([https://www.faa.gov/air\\_traffic/publications](https://www.faa.gov/air_traffic/publications) [see Order JO 7400.2K]). The MOU describes the guidelines for compliance with NEPA and CEQ Regulations (40 CFR Parts 1500-1508). This MOU promotes early coordination between FAA and DoD during the environmental review process associated with the establishment, designation, and modification of SUA, permits the application of "lead agency" and "cooperating agency" procedures, and provides for the issuance of environmental documents for the development, designation, modification, and use of SUA.

**Table 1.7-1. FAA Order 1050.1, Impact Categories to be Considered**

| FAA Resource                                   | Location in EIS                        | Rationale for Exclusion                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air Quality                                    | 3.3 - Air Quality and Greenhouse Gases | N/A                                                                                                                                                                                                                                                                                                                                                                                                  |
| Coastal Resources                              | N/A                                    | PCMS is landlocked, located within the Raton Basin along the western margin of the Great Plains. As PCMS is not located within a Coastal Zone as regulated under the Coastal Zone Management Act of 1972, this resource was eliminated from further consideration.                                                                                                                                   |
| Compatible Land Use                            | Section 3.2 - Land Use                 | N/A                                                                                                                                                                                                                                                                                                                                                                                                  |
| Construction Impacts                           | N/A                                    | No construction activities are proposed as part of the Proposed Action; therefore, this resource was eliminated from further consideration.                                                                                                                                                                                                                                                          |
| Department of Transportation Act: Section 4(f) | N/A                                    | According to FAA Order 1050.1E, Appendix A, Section 6.1c, military training is exempt from Section 4(f).                                                                                                                                                                                                                                                                                             |
| Farmlands                                      | N/A                                    | The Proposed Action would occur within the existing boundary of PCMS. The Farmland Protection Policy Act (FPPA) states "(b) Acquisition or use of farmland by a Federal agency for national defense purposes is exempted by section 1547 (b) of the Act, 7 USC 4208(b)". PCMS was previously converted to military use and is not part of the inventory of farmland to be considered under the FPPA. |
| Fish, Wildlife, and Plants                     | Section 3.7 - Biological Resources     | N/A                                                                                                                                                                                                                                                                                                                                                                                                  |
| Floodplains                                    | Section 3.6 - Water Resources          | N/A                                                                                                                                                                                                                                                                                                                                                                                                  |

**Table 1.7-1. FAA Order 1050.1, Impact Categories to be Considered**

| FAA Resource                                                                                       | Location in EIS                                                 | Rationale for Exclusion                                                                                   |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Hazardous Materials, Pollutions, Prevention, and Solid Waste                                       | Section 3.13 - Hazardous Materials, Waste, and Toxic Substances | Pollution is also discussed in Sections 3.3 (Air Quality and Greenhouse Gases) and 3.6 (Water Resources). |
| Historical, Architectural, Archeological, and Cultural Resources                                   | Section 3.8 - Cultural Resources                                | N/A                                                                                                       |
| Light Emissions and Visual Impacts                                                                 | Section 3.2 - Land Use                                          | N/A                                                                                                       |
| Natural Resources and Energy Supply                                                                | Section 3.12 - Facilities and Utilities                         | N/A                                                                                                       |
| Noise                                                                                              | Section 3.4 - Noise                                             | N/A                                                                                                       |
| Secondary (Induced) Impacts                                                                        | Section 3.9 - Socioeconomics                                    | N/A                                                                                                       |
| Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks | Section 3.9 - Socioeconomics                                    | N/A                                                                                                       |
| Water Quality                                                                                      | Section 3.6 - Water Resources                                   | N/A                                                                                                       |
| Wetlands                                                                                           | Section 3.6 - Water Resources                                   | N/A                                                                                                       |
| Wild and Scenic Rivers                                                                             | Section 3.6 - Water Resources                                   | N/A                                                                                                       |

1 DoD=Department of Defense; FAA=Federal Aviation Administration; FPPA=Farmland Policy Protection Act;  
2 USC=U.S. Code

### 3 **1.7.2 Agencies and Tribal Coordination**

4 In accordance with 32 CFR 651.47 and 40 CFR 1501.4(b), the Army will engage in consultation  
5 with appropriate government agencies and federally-recognized Tribes regarding the Proposed  
6 Action. Initial agency scoping letters were submitted to the Bureau of Land Management (BLM),  
7 Colorado Department of Public Health and Environment (CDPHE), Colorado Department of  
8 Transportation (CDOT), Colorado Parks & Wildlife (CPW), Colorado State Historic Preservation  
9 Office (SHPO), FAA, National Park Service (NPS), Pikes Peak Area Council of Governments,  
10 U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (USEPA), U.S.  
11 Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and the U.S. Geological  
12 Survey (USGS). In addition, Tribal coordination letters were sent to the following 13 federally-  
13 recognized Tribes with cultural affiliation to Fort Carson lands: Apache Tribe of Oklahoma;  
14 Cheyenne and Arapaho Tribes of Oklahoma; Comanche Nation of Oklahoma; Jicarilla Apache  
15 Nation; Kiowa Indian Tribe of Oklahoma; Northern Arapaho Tribe of the Wind River  
16 Reservation, Wyoming; Northern Cheyenne Tribe of the Northern Cheyenne Indian  
17 Reservation, Montana; Ute Indian Tribe of the Uintah & Ouray Reservation; Oglala Sioux Tribe  
18 of the Pine Ridge Reservation; Shoshone Tribe of the Wind River Reservation, Wyoming;



Southern Ute Tribe of the Southern Ute Reservation, Colorado; Ute Mountain Ute Tribe of the Ute Mountain Reservation, Colorado, New Mexico, and Utah; and Wichita and Affiliated Tribes of Oklahoma. No response has been received from these agencies or Tribes regarding scoping. The FAA and CDOT participated in an agency scoping meeting held at Fort Carson on May 6, 2014.

### 1.7.3 Scoping Period Summary

In accordance with NEPA regulations (32 CFR Part 651), the Army issued a Notice of Intent (NOI) to prepare an EIS. This NOI was published in the *Federal Register* on March 25, 2014 (see Appendix A). The NOI initiated the public scoping period (March 25 to May 16, 2014) during which members of the public (including Federal, state, and local agencies, affected federally-recognized Tribes, and other interested persons) were invited to comment on the proposed scope and content of the EIS. The NOI was followed by two public scoping meetings, which took place on May 6<sup>th</sup> (Trinidad) and May 7<sup>th</sup> (La Junta), 2014. Collectively, 110 members of the public attended (an attendance of 45 individuals at the Trinidad Meeting and 65 individuals at the La Junta Meeting). The scoping period was extended by the Army for an additional week due to public interest.

The Army received several comments from interested groups. These groups' comments showed a concern for what baseline would be used in comparing the Proposed Action's environmental effects. Commenters wanted the Army to analyze the impacts both in the past since the Army began putting PCMS to use, as well as the present should the Proposed Action be carried out. Commenters similarly wanted to know what sources of data and methodology were used in determining past and present impacts. The Army also received comments pertaining to the geographical scope to be covered in the EIS: depending on the resource at issue, commenters wanted analysis of environmental impacts sometimes extending beyond PCMS to include areas upstream, downstream, and downwind. Commenters wanted analysis of air space issues, not only on PCMS but also on the training routes surrounding it. Commenters also wanted the Army to present the differences between the vehicle types presently used at PCMS and the Stryker vehicle that would be used at PCMS, as well as an analysis of how this change in vehicle would affect various environmental resources in the area. Commenters also suggested inclusion of an alternative under which PCMS would be closed. All comments from interested persons received during the public scoping period were considered in the preparation of the Draft EIS.

### 1.7.4 Draft EIS Public Comment Period

This Draft EIS was filed with the USEPA, and the Army published a NOA in the *Federal Register* and in newspapers in the vicinity of the Proposed Action that announced the availability of the Draft EIS. Publication of the NOA in the *Federal Register* began the start of a 45-day comment period. During the 45-day comment period, public meetings will be held to provide an opportunity for the public, organizations, and regulatory agencies to present comments and information. At the end of the 45-day period, the Army will consider all comments submitted. When the review of comments and any appropriate revisions are complete, the Final EIS will be filed with the USEPA and made available to the public through a NOA publication in the *Federal Register*. A final decision on the Proposed Action, which is documented in a ROD, may be made after a 30-day waiting period. A ROD is a public document that states the decision, alternatives and factors considered, and the proposed mitigation adopted. The NOA of the ROD is published in the *Federal Register*. Once the ROD has been signed, the Army can begin to implement the decision (32 CFR 651.45(j)(2)).

## 1.8 Regulatory Framework

Fort Carson is guided by relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental, natural, and cultural resources management and planning. These include, but are not limited to, the following:

### Federal Statutes

- NEPA (42 USC 4321–4370h)
- Endangered Species Act of 1973 (ESA) (16 USC 1531–1543)
- Fish and Wildlife Coordination Act (16 USC 661, et seq.)
- Migratory Bird Treaty Act (16 USC 701, et seq.)
- Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668c)
- Clean Water Act of 1977 (CWA) and the Water Quality Act of 1987 (WQA) (33 USC 1251 et seq., as amended)
- Farmland Protection Policy Act of 1981 (7 USC 4201 et seq., as amended)
- The Sikes Act (16 USC 670a-670o, 74 Stat. 1052)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC 9601, et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986)
- Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6901)
- Toxic Substances Control Act (TSCA) (15 USC 2601 et seq., as amended)
- NHPA of 1966 (16 USC 470 et seq., as amended)
- Archeological Resources Protection Act of 1979 (16 USC 470aa-470mm)
- Clean Air Act (CAA) (42 USC 7401 et seq., as amended)
- Noise Control Act of 1972 (42 USC 4901–4918)

### Regulations

- CEQ Regulations for Implementing NEPA (40 CFR Parts 1500–1508)
- Environmental Effects of Army Actions (32 CFR Part 651)
- Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*
- AR 405-70, *Utilization of Real Property*
- Protection of Historic Properties (36 CFR Part 800)

### Executive Orders

- EO 11514, *Protection and Enhancement of Environmental Quality* (as amended by EO 11991)
- EO 11988, *Floodplain Management*
- EO 11990, *Protection of Wetlands*

- EO 12088, *Federal Compliance with Pollution Control Standards*
- EO 12372, *Intergovernmental Review of Federal Programs*
- EO 12580, *Superfund Implementation*
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*
- EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*
- EO 13327, *Federal Real Property Asset Management* (amended by EO 13423)
- EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*

EO 13423 revoked previous EOs pertaining to sustainability and “greening”. CEQ guidance, however, instructs agencies to maintain activities and practices implemented under the revoked EOs until additional guidance for implementing EO 13423 is provided (CEQ, 2007). The revoked EOs pertaining to this NEPA analysis include the following:

- EO 13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*
- EO 13123, *Greening the Government Through Efficient Energy Management*
- EO 13148, *Greening the Government Through Leadership in Environmental Management*

These authorities are addressed in various sections throughout the EIS when relevant to particular environmental resources and conditions. The full text of the laws, regulations, and EOs is available on the Defense Environmental Network & Information Exchange website at <http://www.denix.osd.mil>.

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## **2 Description of the Proposed Action and Alternatives**

### **2.1 Screening Criteria**

Screening criteria were used to assess whether an alternative was “reasonable” and would be carried forward for evaluation in this EIS. The screening criteria are based upon balancing sustainment of the land for training with maximizing troop readiness.

The Army established the following screening criteria to identify the range of potential alternatives that would support the purpose of and need for the Proposed Action.

Reasonable alternatives must:

- Utilize land under Army operational control as Fort Carson does not have the authority to acquire additional lands; the Army has formally ended PCMS land acquisition efforts, in addition to not having the authority to acquire additional lands.
- Be able to provide sufficient land and airspace to support Force-on-Force<sup>3</sup> brigade-level training capacity and capability for Infantry, Armor, and Stryker BCTs, Combat Support (CS), and Combat Service Support (CSS) units based at Fort Carson.
- Enable other Fort Carson training requirements, such as aerial gunnery training, to continue on Fort Carson and not be displaced by maneuver training that could potentially be better-executed at PCMS.
- Be able to provide adequate training, infrastructure and sustainment support capabilities, such as bivouac sites and utilities.
- Be within one day’s reach of Fort Carson by convoy via highway to minimize loss of training time, transportation costs, and time away from families due to lengthy movements.
- Maintain training ranges, maneuver lands, and associated air space capable of supporting current and future military training to standard while maintaining and sustaining training resources.
- Conform to the Installation’s Master Plan (which includes PCMS).

### **2.2 Alternatives Considered**

The following section provides a description of alternatives being considered in this EIS. The No Action Alternative provides a baseline comparison of impacts from existing training and operations to those projected under the Proposed Action Alternatives’ potential future training activities. Two alternatives for implementing the Proposed Action have been analyzed. Alternative 1A considers brigade-level training only (see Section 2.2.2). Alternative 1B considers a combination of brigade-level training and brigade training elements which would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements (see Section 2.2.3).

#### **2.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS**

Under the No Action Alternative, the Proposed Action would not be implemented. The Army would continue to use the current land management model using 4.4 to 4.7 brigade training periods (months) per year and for the same types of brigade-level training that were approved in

<sup>3</sup> Force-on-Force training could involve single BCT training scenarios, composed of multiple units within a BCT. It could also involve Soldiers from multiple BCTs. For instance, Soldiers from other Fort Carson BCTs could serve in opposition force or observer/controller capacities.

the 1980 EIS. SMA and Total Task Miles would not be used as a method for measuring brigade-level training intensity. Force structure, assigned personnel and equipment, and training operations at PCMS would remain unchanged.

The 1980 EIS approved 4.4 to 4.7 brigade training periods (months) using a mechanized brigade configuration at PCMS. This configuration consisted of 5,035 Soldiers, 826 wheeled vehicles, and 432 tracked vehicles per 30-day training iteration. Each training period also included 774 hours of helicopter support, and Air Force sortie support as requested.

Using current BCT configurations (Section 2.2.2.1), 3/4 ABCT has the most Soldiers, and tracked and wheeled vehicles, relative to any other unit on Fort Carson. It has 4,655 Soldiers, 830 wheeled, 316 tracked vehicles, and is the most similar to the mechanized brigade studied in the 1980 EIS. Table 2.2-1 presents a summary comparison of the 1980 EIS mechanized brigade training period and current ABCT training period.

**Table 2.2-1. Summary Comparison of Brigade Training Periods Relative to the 1980 EIS and Proposed Action Alternatives at PCMS**

| Category                                    | 1980 Land Acquisition EIS<br>(Heavy BDE) <sup>a</sup> | Proposed Action Alternatives<br>(ABCT)   |
|---------------------------------------------|-------------------------------------------------------|------------------------------------------|
| BDE Training Months                         | 4.4 - 4.7 Months                                      | 4.4 - 4.7 Months                         |
| Standard Maneuver Area and Total Task Miles | Method not developed                                  | Method used                              |
| Actual BDE Training Duration                | 30 days                                               | 25-30 days                               |
| Soldier Population per Event                | 5,085                                                 | 4,655                                    |
| Wheeled Vehicles                            | 826                                                   | 830                                      |
| Tracked Vehicles                            | 432                                                   | 316                                      |
| Helicopter Support                          | 774 Hours                                             | 1,240 Hours <sup>b</sup>                 |
| Air Force Tactical Support <sup>c</sup>     | 100 Missions spread over a 1-year period              | 100 Missions spread over a 1-year period |

a. Data from 1980 Land Acquisition EIS.

b. Impacts associated with the increase in helicopter support hours were analyzed in the 2012 Fort Carson Combat Aviation Brigade Stationing Implementation Final Environmental Assessment.

c. Missions would be flown with an average of two aircraft per mission. During a mission, three to five tactical passes would be accomplished over a 35-minute period. For certain training periods, missions may be required on 10 to 12 days while other training periods may not require any air support. On a single day, the greatest number of missions expected is 6 to 7 over a 12-hour period from dawn to dusk. A night mission may occur once during the 20-day training period.

The No Action Alternative allows heavy maneuver training at PCMS of units stationed at Fort Carson under the parameters of the 1980 EIS. But it fails to meet most aspects of the purpose and need described in Chapter 1. The No Action Alternative is required by NEPA regulations to encompass baseline conditions and serves as a benchmark against which the environmental impacts of the Proposed Action alternatives can be compared.

## **2.2.1.1 Force Structure**

### **2.2.1.1.1 Current Force Structure**

The No Action Alternative considers the current BCT force structure in place at Fort Carson. This baseline establishes a measure to compare the No Action Alternative with the Proposed Action Alternatives. The baseline is realistic in terms of overall troop levels and training needs. The stationing of units, however, is dynamic, and the description of the force structure described here might not depict the on the ground conditions at Fort Carson and related training schedules at PCMS.

Under the No Action Alternative, PCMS would provide Soldier and support facilities to meet the training requirements of the following major units stationed at Fort Carson:

- 1<sup>st</sup> Brigade, 4<sup>th</sup> ID, SBCT
- 2<sup>nd</sup> Brigade, 4<sup>th</sup> ID, IBCT
- 3<sup>rd</sup> Brigade, 4<sup>th</sup> ID, ABCT
- 4<sup>th</sup> Combat Aviation Brigade
- 43<sup>rd</sup> Sustainment Brigade
- 10<sup>th</sup> Special Forces

The largest Fort Carson brigade in Soldiers and equipment is 3/4 ABCT with approximately 4,655 Soldiers, 830 wheeled vehicles, and 316 tracked vehicles. These quantities are similar to the 1980 EIS Soldier, vehicle, and equipment mix baseline (see Table 2.2-1). The second largest brigade is 1/4 SBCT followed by 2/4 IBCT with 4,454 and 4,296 Soldiers, respectively. The 4<sup>th</sup> Combat Aviation Brigade consists of approximately 2,700 Soldiers and 113 helicopters. The 43<sup>rd</sup> Sustainment Brigade consists of approximately 2,800 Soldiers, and 10<sup>th</sup> Special Forces Group consists of approximately 1,200 personnel in three battalions. Collectively, Fort Carson's brigade-size units total approximately 20,105 Soldiers. Only the BCTs conduct full brigade-level exercises at PCMS.

### **2.2.1.2 Equipment**

Under the No Action Alternative, units train at PCMS using the same equipment as at Fort Carson, unless not authorized for use. The type, use, and training area requirements of the equipment assigned to PCMS and/or Fort Carson are described in Table 2.2-2. Figure 2.2-1 presents representative images of similar equipment.

**Table 2.2-2. Example Equipment Assigned to Fort Carson Units<sup>a</sup>**

| <b>Category</b>    | <b>Equipment<sup>b</sup></b>                       | <b>Mission</b>                                                                                                                                                                                     | <b>Training Area Requirements</b>                                                         |
|--------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Tracked Vehicles   | M1A2 Abrams Main Combat Tank                       | Provides heavy armor superiority on the battlefield (simulated ammunition)                                                                                                                         | Maneuver areas and firing ranges                                                          |
|                    | M2/M3 Bradley Fighting Vehicles                    | Provide protected transport of an infantry squad and overwatches fires to support the dismounted infantry (simulated ammunition)                                                                   |                                                                                           |
|                    | M109 Paladin Self-Propelled Howitzer               | Provides the artillery support for armored and mechanized units (155-mm artillery training round)                                                                                                  |                                                                                           |
|                    | M113A3                                             | Provides a highly mobile, survivable, and reliable tracked vehicle platform that is able to keep pace with Abrams and Bradleys                                                                     |                                                                                           |
| Wheeled Vehicles   | Family of Medium Tactical Vehicles                 | Fills the Army's medium tactical-vehicle requirements for mobility and resupply, and transportation of equipment and personnel                                                                     | Maneuver areas                                                                            |
|                    | Heavy Expanded Mobility Tactical Truck (HEMTT)     | Provides line haul and unit resupply; rapid movement of combat-configured loads of ammunition and all classes of supply, shelters and containers                                                   |                                                                                           |
|                    | High-Mobility Multipurpose Wheeled Vehicle (HMMWV) | Provides a common light tactical vehicle capability                                                                                                                                                |                                                                                           |
|                    | Stryker                                            | Provides increased combat power by providing armor protection, a vehicle-borne weapon system to support dismounted squads, and the speed and range to conduct missions far from the operating base |                                                                                           |
| Engineer Equipment | Dozers, scrapers, loaders, excavators, dump trucks | Performs horizontal construction to ensure mobility and post support for strike, sustainment, and logistics forces                                                                                 | Maneuver areas and dig locations; excavation training might require clearing and grubbing |
| Aerial             | Unmanned Aerial Systems (UAS)                      | Provides commanders the ability to see beyond the horizon, conduct reconnaissance and strike targets                                                                                               | Adequate launch surface, airspace coordination                                            |
| Indirect Fire      | Simulated Ammunition                               | Provides long-range destructive suppressive, and protective indirect and direct field simulated ammunition fires (training ammunition)                                                             | Maneuver areas                                                                            |
|                    | Mortars                                            | Provides medium-range indirect fire support (no ammunition)                                                                                                                                        |                                                                                           |



**Table 2.2-2. Example Equipment Assigned to Fort Carson Units<sup>a</sup>**

| Category                           | Equipment <sup>b</sup>                                           | Mission                                                                                                                          | Training Area Requirements       |
|------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Anti-armor                         | Javelin Anti-Tank Missile                                        | Provides a man-portable, highly survivable medium anti-tank weapon system (simulator)                                            | Maneuver areas and firing ranges |
|                                    | Tube-Launched, Optically-Sited, Wire-Guided (TOW) Missile System | Defeats threat armored vehicles and urban enclosed threats at extended ranges in all expected battlefield conditions (simulator) |                                  |
| Individual and Crew-Served Weapons | M2 .50-Caliber Machine Gun                                       | Engages targets with accurate automatic direct fire (.50-caliber)                                                                | Firing Ranges                    |
|                                    | MK-19 Automatic Grenade Launcher                                 | Engages targets with accurate automatic indirect fire (40-mm training grenades)                                                  |                                  |
|                                    | M240B Machine Gun                                                | Engages targets with accurate automatic direct fire (7.62-mm)                                                                    |                                  |
|                                    | M249 Squad Automatic Weapon                                      | Engages targets with accurate automatic direct fire (5.56-mm)                                                                    |                                  |
|                                    | M-4 Carbine                                                      | Engages targets with accurate direct fire (5.56-mm)                                                                              |                                  |
|                                    | M9 Pistol                                                        | Engages targets with accurate direct fire (9-mm)                                                                                 |                                  |
|                                    | M-16 Rifle                                                       | Engages targets with accurate direct fire (5.56-mm)                                                                              |                                  |
|                                    | M203 Grenade Launcher                                            | Engages targets with accurate indirect short-range fire (40-mm training grenades)                                                |                                  |

- a. The table presents Fort Carson units that also train at PCMS.
- b. The equipment presented in this table is presented for representative purposes only and does not include all equipment.



1 **Figure 2.2-1. Example Equipment Used at or Assigned to Fort Carson and PCMS**

### 2.2.1.3 Construction and Operation

Under the No Action Alternative, no major capital improvements would be implemented. Any facility construction on PCMS would be subject to separate environmental review under NEPA.

### 2.2.1.4 Training Needs

Under the No Action Alternative, PCMS would continue to support training of active duty units and some reserve component units assigned to, or otherwise under the responsibility of, Fort Carson. PCMS would support the rotations of the current BCTs, CAB, and tenant units stationed at Fort Carson.

### 2.2.1.5 Description of Training Activities

Under the No Action Alternative, the current types and areas of training activities would continue. The training areas at PCMS provide areas for different types of training, as listed below. Numbered training areas are available for maneuver, and lettered training areas are available for dismounted training only. Small-arms live-fire ranges, when in use, preclude other training activities. Additionally, there are small restricted areas at PCMS. Use of these areas is summarized below and further described in Section 2.2.1.5, Description of Training Activities.

- Maneuver training areas comprise the majority of land at PCMS and support equipment (tracked vehicles, wheeled vehicles, and engineering equipment) moving throughout the area in accordance with the requirements of the training exercise. No live fire weapons or explosive ammunitions are used by tanks at PCMS. Maneuvers can occur both on-road and off-road.
- Small-arms live-fire ranges at PCMS include locations where small arms (up to .50-caliber) are fired. Small-arms live-fire ranges at PCMS are used as maneuver training areas when not active.
- Dismounted training areas are areas where Soldiers can move on foot but no vehicular traffic is permitted. Dismounted training areas at PCMS primarily include canyons that are unsuitable for mechanized training. Dismounted training results in environmental impacts that are similar to those caused by recreation activities, such as hiking or camping.
- Restricted areas protect, to varying degrees, cultural resources, facilities, or environmental values and are restricted from certain types of training activities, depending on the resource to be protected. Therefore, activities in these areas do not normally result in any adverse environmental impacts.

Existing regulations and land management practices as described Section 2.5 would continue to be implemented.

## 2.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement

Alternative 1A would develop and implement new brigade-level training intensity measures, update brigade training rotation equipment compositions and training methods described in the 1980 EIS, and enable the Stryker family of vehicles to train at PCMS. This alternative would establish a benchmark for brigade-level training intensity using the Army's SMA measurement, and Fort Carson's current brigade-level training activities at PCMS. When coupled with the 4.4 - 4.7 months of allowable brigade-level training periods per year, measurable parameters would be in place for both training duration and intensity. Currently, brigade-level training duration is extensively monitored; however, training intensity has proven more difficult to quantify. For this

reason, Fort Carson proposes to employ SMA assessment for training intensity measurement in this EIS and future NEPA analyses.

This alternative only considers activity within the currently established boundaries of PCMS, with a limited exception – transportation of equipment and Soldiers to and from PCMS would entail some degree of off-post activities. As previously stated, the Proposed Action Alternatives do not include, and would not require, any expansion of PCMS. No additional land will be sought or acquired as a result of this action.

No facilities construction is required to support PCMS training operations under the Proposed Action Alternatives. Foreseeable future construction of facilities is analyzed within the cumulative impacts discussion (see Chapter 4).

### **2.2.2.1 SMA and Total Task Miles**

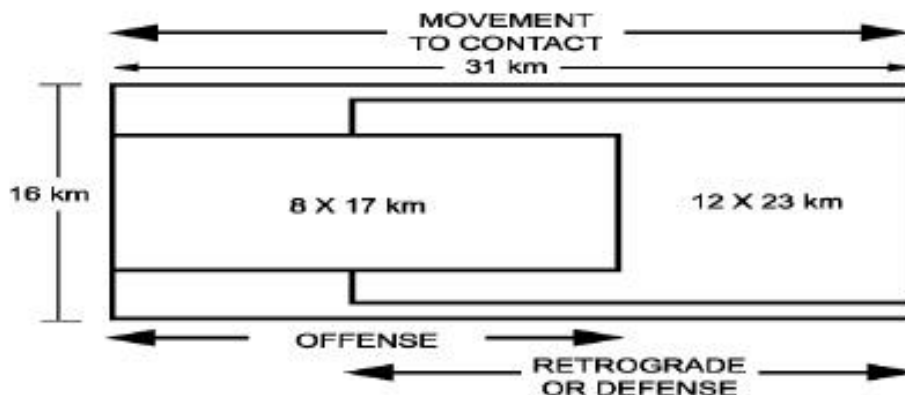
In accordance with Training Circular 25-1 (TC 25-1), *Training Ranges*, today's full spectrum operations at PCMS include offensive, defensive and stability operations/support operations and range across the spectrum of conflict. These missions may occur simultaneously, may be combined, or may transition from one to another and thus require skillful assessment, planning, preparation and execution. To successfully accomplish these missions, commanders focus on their mission essential task list (METL), training time and resources on combat tasks and conduct battle-focused training. Adequate realistic and complex maneuver/training areas, the Army's "outdoor classroom", are the most critical training resources in the Live, Virtual and Constructive (LVC) training environment (TC 25-1).

Unit collective training is derived directly from the unit METL and Mission Training Plans (MTP). It must be conducted to Army standard and conform to Army doctrine. It identifies missions, provides collective task matrix, and describes the training exercises. Units are required to report their unit readiness levels to higher headquarters based on proficiency levels of their METL.

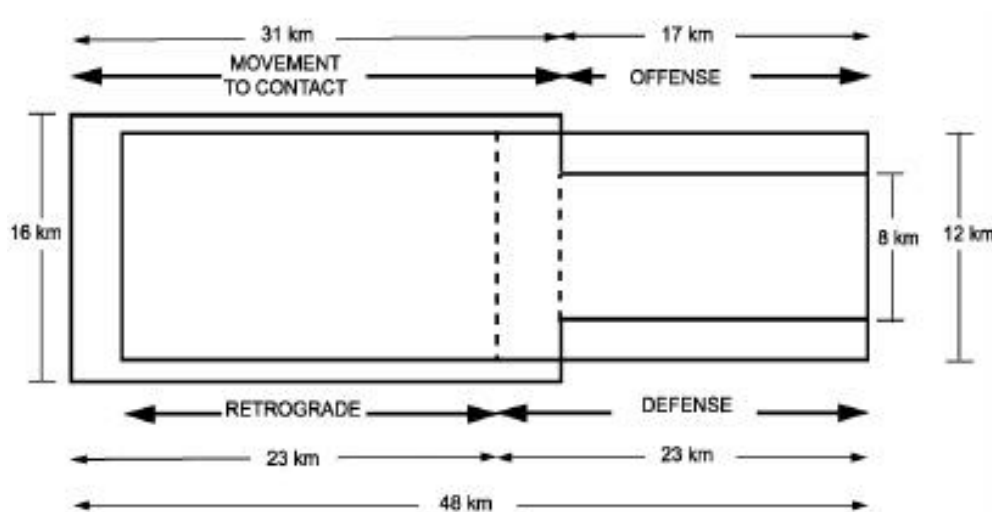
Unit Commanders are limited to training within the SMA by the annual mileage limitations for each specific combat vehicle. Annual funding for fuel, repair parts, and vehicle services are tied to mileage limitations. If an event were conducted that exceeded the scope that is outlined in the training doctrine, that unit would quickly exhaust its annual funding allocations for fuel, repair parts, and services and will not have the ability to train to standard.

Brigade and Battalion Level Exercises. Brigade and Battalion Commanders use a combination of LVC training to achieve and sustain unit and staff proficiency on METL and supporting battle tasks. Brigade-size units rely more on Virtual and Constructive (VC) training to sustain warfighting proficiency. Battalion-size units attain and sustain their warfighting proficiency and develop Soldier fieldcraft, primarily through live training. Smaller units train "in the dirt", using VC training to prepare for live training or to retrain on critical tasks.

Current Forces - Brigade Operational Training. BCTs train to standard on full spectrum operations, which include offensive, defensive, stability and support operations. Commanders train units on the different forms of maneuver or types of defense within these operations, based on his assessment of unit proficiency and Mission, Enemy, Terrain and Weather, Troops and Support Available, Time Available, Civil Considerations (METT-TC). Example figures from TC 25-1 depict heavy/mechanized BCT offensive maneuver/training area requirements (see Figures 2.2-2 and 2.2-3).



1 **Figure 2.2-2. BCT Maneuver/Training Requirements (isolated events)**



2 **Figure 2.2-3. BCT Maneuver/Training Area Requirements (flowing scenario)**

3 The example in Figure 2.2-2 portrays a maneuver/training area requirement, or “box”, of  
4 approximately 122,500 acres – PCMS has 190,000 acres of maneuverable land. The BCT can  
5 train each maneuver task individually within this larger box, stopping after each exercise to  
6 reposition forces. This is a potential training distracter and wastes valuable training time.  
7 Training repetitively on the same terrain also does not stress essential tactical skills.

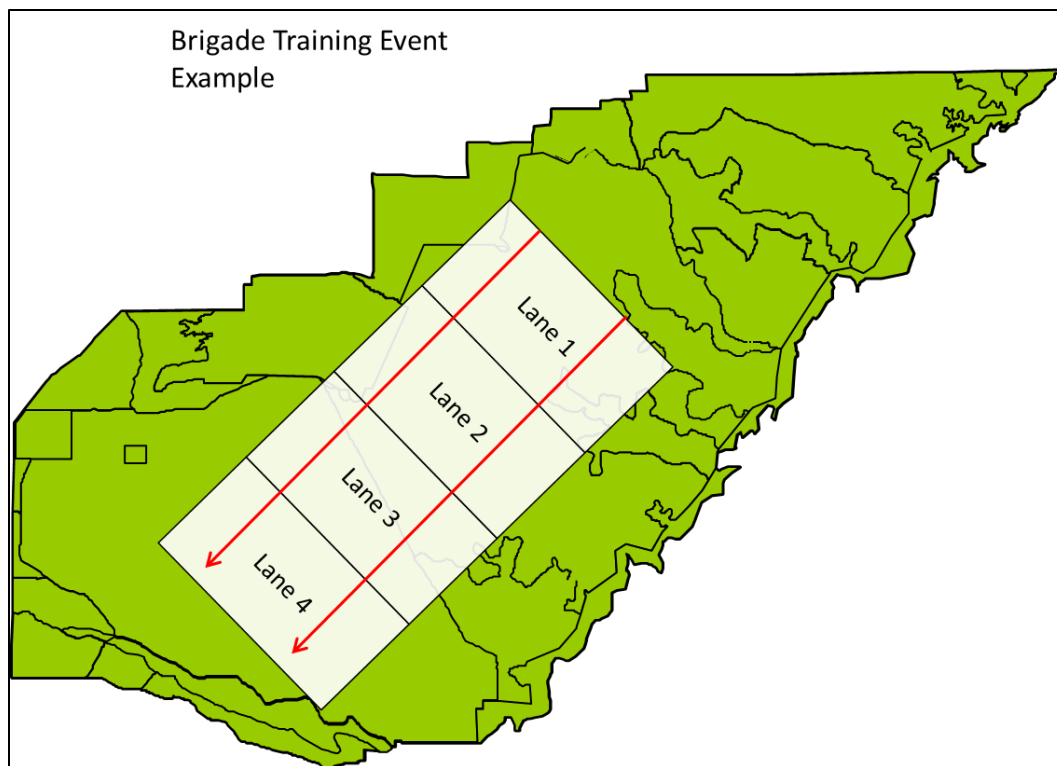
8 The example in Figure 2.2-3 is “free-flowing” and does not require timeouts for repositioning  
9 forces, but it requires an additional 50,000 acres compared to Figure 2.2-2. Both examples  
10 assume the three task forces are employed “two up and one back”, the majority of CS and CSS  
11 units are inside the boxes, and an appropriate size OPFOR is used.

12 The brigade trains as individual battalions in the earlier stages of the exercise. Within PCMS,  
13 units create smaller “boxes” or lanes, where a battalion will conduct individual specific mission  
14 essential tasks (tasks) as depicted in Figure 2.2-4. The battalion units can conduct multiple  
15 tasks concurrently inside their lanes. Each lane represents one or more tasks of the brigade  
16 METL. When a battalion completes its tasks in one lane, it moves on to the next lane, while  
17 another unit begins its tasks. This enables the battalions to train in an efficient “round robin”  
18 method that systematically trains all of the battalions simultaneously on different tasks.



**Figure 2.2-4. Battalion Training Task Lane example at PCMS**

- 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9
  - 10
- When the last battalion completes its tasks in a lane, the lane is removed. Assigned unit personnel and equipment clean up the removed lane. They pick up trash, fill in fighting positions, remove obstacles, and remove any additional accessories that were used in the development of the lane. The lane may be used again (a portion of or in whole) as a component of the brigade culminating event (described below). If this occurs, new obstacles and accessories would be placed in the lane in preparation for the final brigade event.
- The final stage of the exercise is the culminating event and is conducted as an entire brigade. The brigade trains as one synchronized unit, where they encounter all or most of the unit's tasks one after another from start to finish (Figure 2.2-5).



**Figure 2.2-5. Brigade Training Event Example at PCMS**

By identifying the Units and their assigned vehicles, the SMA can be calculated. The SMA for the 3<sup>rd</sup> Armored Brigade, 4<sup>th</sup> ID (3ABCT), identified by square kilometers is shown in (Table 2.2-3). The SMA (the ideal amount of area required for a specific task), is the area of the entire maneuver box that will be utilized. Using the length of the SMA, multiplied by the number of vehicles, number of tasks (the specific tasks required to be accomplished by Army doctrine), and number of repetitions (total times a specific unit will conduct a task during a PCMS exercise), miles (in length) can be calculated that each vehicle would drive to accomplish its task (resulting in Total Task Miles). Based on army doctrine, the Total Task Miles for a typical exercise by the 3ABCT at PCMS (tracked and wheeled vehicles) would total about 83,181 miles.



**Table 2.2-3. Standard Maneuver Area Requirements for the 3ABCT**

| <b>3<sup>rd</sup> Armored Brigade Combat Team / 4th Infantry Division (3ABCT)</b> |                                                             |              |                              |                            |                         |               |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------|--------------|------------------------------|----------------------------|-------------------------|---------------|
| <b>1<sup>st</sup> Battalion / 8th Infantry Regiment (1/8 INF BN)</b>              |                                                             |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                            |                                                             |              | <b>87</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                            |                                                             |              | <b>39</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                    | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                   | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                               | 8 X 31 = 248                                                | 19           | 2                            | 2                          | 3351                    | 1502          |
| Offense                                                                           | 4 X 17 = 68                                                 | 11           | 2                            | 2                          | 1837                    | 824           |
| Defense                                                                           | 6 X 23 = 138                                                | 14           | 2                            | 2                          | 2487                    | 1115          |
| Retrograde                                                                        | 6 X 23 = 138                                                | 14           | 2                            | 2                          | 2487                    | 1115          |
| Recon and Security                                                                | Integral to all other missions. No separate space required. |              |                              |                            |                         |               |
| <b>Totals</b>                                                                     |                                                             |              |                              |                            | <b>10162</b>            | <b>4556</b>   |
| <b>1<sup>st</sup> Battalion / 66th Armor Regiment (1/66 AR BN)</b>                |                                                             |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                            |                                                             |              | <b>87</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                            |                                                             |              | <b>39</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                    | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                   | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                               | 8 X 31 = 248                                                | 19           | 2                            | 2                          | 3351                    | 1502          |
| Offense                                                                           | 4 X 17 = 68                                                 | 11           | 2                            | 2                          | 1837                    | 824           |
| Defense                                                                           | 6 X 23 = 138                                                | 14           | 2                            | 2                          | 2487                    | 1115          |
| Retrograde                                                                        | 6 X 23 = 138                                                | 14           | 2                            | 2                          | 2487                    | 1115          |
| Recon and Security                                                                | Integral to all other missions. No separate space required. |              |                              |                            |                         |               |
| <b>Totals</b>                                                                     |                                                             |              |                              |                            | <b>10162</b>            | <b>4556</b>   |
| <b>1<sup>st</sup> Battalion / 68th Armor Regiment (1/68 AR BN)</b>                |                                                             |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                            |                                                             |              | <b>87</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                            |                                                             |              | <b>39</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                    | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                   | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                               | 8 X 31 = 248                                                | 19           | 2                            | 2                          | 3351                    | 1502          |
| Offense                                                                           | 4 X 17 = 68                                                 | 11           | 2                            | 2                          | 1837                    | 824           |
| Defense                                                                           | 6 X 23 = 138                                                | 14           | 2                            | 2                          | 2487                    | 1115          |
| Retrograde                                                                        | 6 X 23 = 138                                                | 14           | 2                            | 2                          | 2487                    | 1115          |
| Recon and Security                                                                | Integral to all other missions. No separate space required. |              |                              |                            |                         |               |
| <b>Totals</b>                                                                     |                                                             |              |                              |                            | <b>10162</b>            | <b>4556</b>   |



**Table 2.2-3. Standard Maneuver Area Requirements for the 3ABCT**

| <b>4<sup>th</sup> Squadron / 10th Cavalry Regiment (4/10 CAV)</b>            |                                                             |              |                                                   |                            |                         |               |
|------------------------------------------------------------------------------|-------------------------------------------------------------|--------------|---------------------------------------------------|----------------------------|-------------------------|---------------|
| <b>Total Tracked Vehicles Assigned</b>                                       |                                                             |              | <b>49</b>                                         |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                       |                                                             |              | <b>56</b>                                         |                            |                         |               |
| <b>Mission Essential Tasks</b>                                               | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b>                      | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                              | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                                                   |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                          | 12 X 30 = 360                                               | 19           | 2                                                 | 2                          | 1827                    | 2088          |
| Offense                                                                      | 12 X 30 = 360                                               | 19           | 2                                                 | 2                          | 1827                    | 2088          |
| Defense                                                                      | 4 X 15 = 60                                                 | 9            | 2                                                 | 2                          | 913                     | 1044          |
| Retrograde                                                                   | 2 X 13 = 26                                                 | 8            | 2                                                 | 2                          | 792                     | 905           |
| Recon and Security                                                           | Integral to all other missions. No separate space required. |              |                                                   |                            |                         |               |
| <b>Totals</b>                                                                |                                                             |              |                                                   |                            | <b>5359</b>             | <b>6125</b>   |
| <b>3<sup>rd</sup> Battalion / 29th Field Artillery Regiment (3/29 FA BN)</b> |                                                             |              |                                                   |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                       |                                                             |              | <b>50</b>                                         |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                       |                                                             |              | <b>80</b>                                         |                            |                         |               |
| <b>Mission Essential Tasks</b>                                               | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b>                      | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                              | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                                                   |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Deliver Fires                                                                | 15 X 31 = 465                                               | 19           | 2                                                 | 2                          | 1926                    | 3082          |
| Move                                                                         | 3 X 15 = 45                                                 | 9            | 2                                                 | 2                          | 932                     | 1491          |
| Survive                                                                      | 2 x 2 = 4                                                   | 3            | 2                                                 | 2                          | 249                     | 398           |
| <b>Totals</b>                                                                |                                                             |              |                                                   |                            | <b>3107</b>             | <b>4971</b>   |
| <b>588<sup>th</sup> Brigade Engineer Battalion (588<sup>th</sup> BEB)</b>    |                                                             |              |                                                   |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                       |                                                             |              | <b>43 (including 16 dozers)</b>                   |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                       |                                                             |              | <b>109 (including three Stryker NBC Vehicles)</b> |                            |                         |               |
| <b>Mission Essential Tasks</b>                                               | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b>                      | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                              | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                                                   |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Mobility Operations                                                          | 12 X 16 = 192                                               | 10           | 1                                                 | 1                          | 427                     | 1084          |
| Countermobility Ops.                                                         | 12 X 16 = 192                                               | 10           | 1                                                 | 1                          | 427                     | 1084          |
| Survivability Ops.                                                           | 12 X 16 = 192                                               | 10           | 1                                                 | 1                          | 427                     | 1084          |
| General Engineering                                                          | 12 X 16 = 192                                               | 10           | 1                                                 | 1                          | 427                     | 1084          |
| Fight as Engineers                                                           | 6 X 17 = 102                                                | 11           | 1                                                 | 1                          | 454                     | 1151          |
| <b>Totals</b>                                                                |                                                             |              |                                                   |                            | <b>2162</b>             | <b>5487</b>   |

**Table 2.2-3. Standard Maneuver Area Requirements for the 3ABCT**

| <b>64<sup>th</sup> Brigade Support Battalion (64<sup>th</sup> BSB)</b>                                               |                                                             |              |                                                    |                            |                         |               |
|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------|----------------------------------------------------|----------------------------|-------------------------|---------------|
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                             |              | <b>49 (including 36 tracked recovery vehicles)</b> |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                             |              | <b>535*</b>                                        |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b>                       | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                                                    |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Tactical Operations                                                                                                  | 6 X 20 = 120                                                | 12           | 1                                                  | 5                          | 609                     | 6650          |
| Note* Majority of wheeled vehicles convoy on roadways and remain stationary once at the Battalion Support Area (BSA) |                                                             |              |                                                    |                            |                         |               |
| <b>3<sup>rd</sup> ABCT Headquarters and Headquarters Battalion (3ABCT HHBN)</b>                                      |                                                             |              |                                                    |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                             |              | <b>5</b>                                           |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                             |              | <b>34</b>                                          |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b>                       | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b>            | <b>Miles</b> |                                                    |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                                                                  | 8 X 31 = 248                                                | 19           | 2                                                  | 2                          | 193                     | 1310          |
| Offense                                                                                                              | 4 X 17 = 68                                                 | 11           | 2                                                  | 2                          | 106                     | 718           |
| Defense                                                                                                              | 6 X 23 = 138                                                | 14           | 2                                                  | 2                          | 143                     | 972           |
| Retrograde                                                                                                           | 6 X 23 = 138                                                | 14           | 2                                                  | 2                          | 143                     | 972           |
| Recon and Security                                                                                                   | Integral to all other missions. No separate space required. |              |                                                    |                            |                         |               |
| <b>Totals</b>                                                                                                        |                                                             |              |                                                    |                            | <b>585</b>              | <b>3972</b>   |
| <b>TOTAL BRIGADE MILES AT PCMS</b>                                                                                   |                                                             |              |                                                    |                            |                         |               |
| <b>3<sup>rd</sup> Armored Brigade Combat Team / 4th Infantry Division (3ABCT)</b>                                    |                                                             |              |                                                    |                            |                         |               |
| <b>TRACKED VEHICLES</b>                                                                                              |                                                             | 42308        | <b>WHEELED VEHICLES</b>                            |                            | 40873                   |               |

Note: Distance values have been rounded to the nearest mile.

### 2.2.2.2 Armor Brigade Combat Team Training

Under Proposed Action Alternative 1A, the Soldier and equipment density during ABCT-level training events at PCMS as a result of the Army's 2013 decision to assign an additional maneuver battalion to the remaining ABCT, increased the number of maneuver battalions from two to three. Soldier and equipment allowances for individual maneuver battalions include approximately 600 Soldiers, 90 tracked vehicles, and 40 wheeled vehicles. The incorporation of an additional maneuver battalion increased ABCT Soldier and equipment densities to approximately 4,600 Soldiers and increased tracked vehicles per ABCT-level training events to about 441, if the unit trains as a whole. Overall, however, a loss of 577 tracked vehicles occurred from the conversion of the 4ID BCTs at Fort Carson (a reduction of 256 M113s, 87 M1 Abrams Tanks, and 234 Bradley Fighting Vehicles). Table 2.2-4 (page 2-17) includes the Total Task Miles for the additional maneuver battalion.

ABCT-size training at PCMS has occurred only two times since 2002. It is not anticipated that ABCT training would occur more than one time per year at PCMS under Proposed Action Alternative 1A. The 2013 ABCT-level training event occurred for approximately 25 days

1 between February and March 2013. The 2/4 ABCT conducted actual maneuver training at  
2 PCMS for collectively 19 days. Company-level training occurred for 14 days and  
3 battalion/brigade-level training occurred for five days in Training Areas 7, 10, and 12. Using the  
4 SMA measurements, Fort Carson determined the actual Total Task Miles from the 2/4 ABCT  
5 training event at PCMS. Figures 2.2-6 and 2.2-7, depict the 2/4 ABCT maneuver training areas.  
6 Figure 2.2-6 shows the battalion task lanes and length of area. Figure 2.2-7 represents the  
7 brigade lanes. By identifying the length of the “lane” or “box” for each mission essential task,  
8 assuming that each combat vehicle would drive the entire length of each lane, the actual Total  
9 Task Miles for the ABCT training event were calculated.

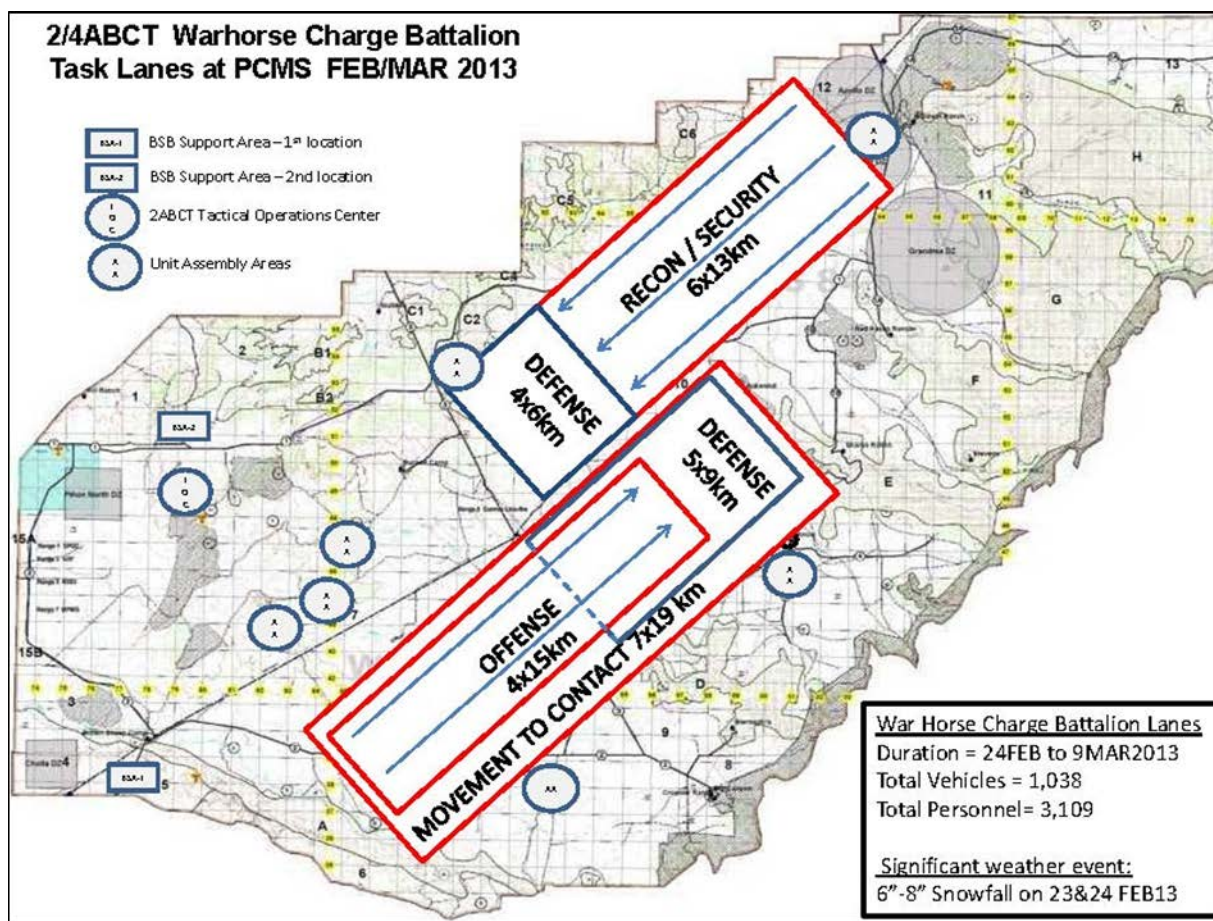
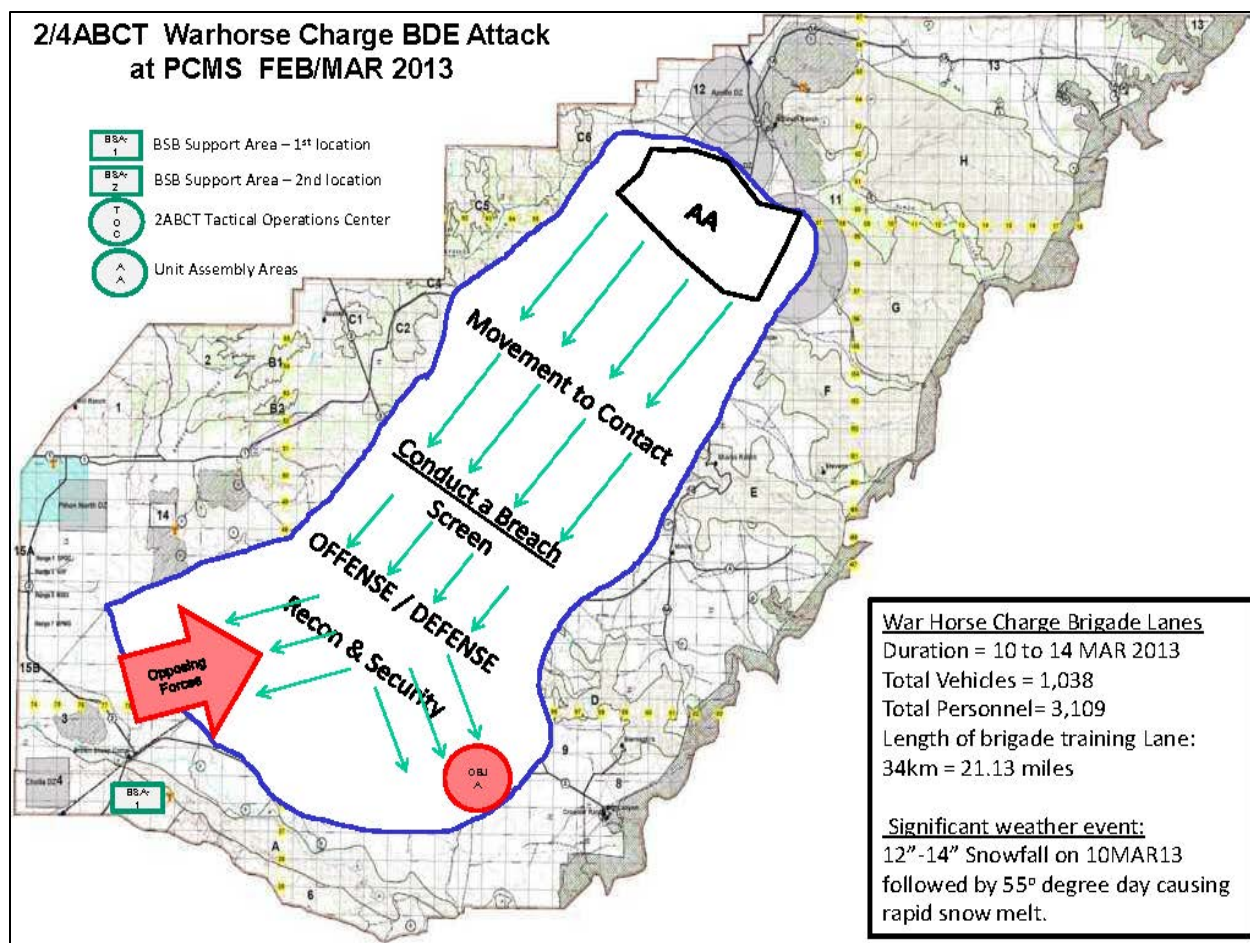


Figure 2.2-6. 2013 2<sup>nd</sup> ABCT, 4<sup>th</sup> ID's Battalion Task Lanes at PCMS





**Figure 2.2-7. 2013 2nd ABCT, 4<sup>th</sup> ID's Brigade Task Lanes at PCMS**

Table 2.2-4 shows the calculated Total Task Miles associated with the 2013 training event. The actual Total Task Miles were 63,570. The damage assessed was 1,400 acres, of the 113,000 acres that were utilized for the training event. Maneuver damage is the disturbance to the land by vehicles (tracked and wheeled) and includes ruts, compacting soil, and stripped vegetation from the ground. The amount and severity of the damage is subject to a number of factors (i.e., soil type, soil moisture, vegetation type, duration of training, etc.). Some maneuver damage can recover on its own, however, ensuring the maximum sustainable use of Fort Carson and PCMS training lands requires an understanding of where training impacts occur, the specific conditions that lead to training land degradation, and the prompt identification of areas in need of rehabilitation.

The actual damage assessed was less than 2 percent of the total land within the 113,000 acres that were utilized by the 2/4 ABCT (See Section 2.5.3.2, Recent Restoration and Rehabilitation at PCMS).

**Table 2.2-4. SMA and Total Task Miles for the 2<sup>nd</sup> Armored Brigade, 4<sup>th</sup> ID (2/4ABCT)**

| <b>2<sup>nd</sup> Armored Brigade Combat Team / 4<sup>th</sup> Infantry Division (2/4ABCT)</b> |                                                             |              |                              |                            |                         |               |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------|------------------------------|----------------------------|-------------------------|---------------|
| <b>BRIGADE Training Event March 2013</b>                                                       |                                                             |              |                              |                            |                         |               |
| <b>2<sup>nd</sup> Battalion / 8<sup>th</sup> Infantry Regiment (2/8 INF BN)</b>                |                                                             |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                         |                                                             |              | <b>88</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                         |                                                             |              | <b>42</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                 | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                | <b>Kilometers (km x km = km<sup>2</sup>)</b>                | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                                            | 7 X 19 = 133                                                | 19           | 2                            | 2                          | 2079                    | 992           |
| Offense                                                                                        | 4 X 15 = 60                                                 | 9            | 2                            | 2                          | 1640                    | 783           |
| Defense                                                                                        | 11 X 13 = 143                                               | 8            | 2                            | 2                          | 1422                    | 679           |
| Retrograde                                                                                     | 6 X 13 = 78                                                 | 8            | 2                            | 2                          | 1422                    | 679           |
| Recon and Security                                                                             | Integral to all other missions. No separate space required. |              |                              |                            |                         |               |
| BDE Attack                                                                                     | 11 X 28 = 308                                               | 17           | 1                            | 5                          | 1531                    | 731           |
| <b>Totals</b>                                                                                  |                                                             |              |                              |                            | <b>8094</b>             | <b>3864</b>   |
| <b>1<sup>st</sup> Battalion / 67<sup>th</sup> Armor Regiment (1/67 AR BN)</b>                  |                                                             |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                         |                                                             |              | <b>88</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                         |                                                             |              | <b>42</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                 | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                | <b>Kilometers (km x km = km<sup>2</sup>)</b>                | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                                            | 7 X 19 = 133                                                | 19           | 2                            | 2                          | 2079                    | 992           |
| Offense                                                                                        | 4 X 15 = 60                                                 | 9            | 2                            | 2                          | 1640                    | 783           |
| Defense                                                                                        | 11 X 13 = 43                                                | 8            | 2                            | 2                          | 1422                    | 679           |
| Retrograde                                                                                     | 6 X 13 = 78                                                 | 8            | 2                            | 2                          | 1422                    | 679           |
| Recon and Security                                                                             | Integral to all other missions. No separate space required. |              |                              |                            |                         |               |
| BDE Attack                                                                                     | 11 X 28 = 308                                               | 17           | 1                            | 5                          | 1531                    | 731           |
| <b>Totals</b>                                                                                  |                                                             |              |                              |                            | <b>8094</b>             | <b>3864</b>   |
| <b>1<sup>st</sup> Squadron / 10<sup>th</sup> Cavalry Regiment (1/10 CAV)</b>                   |                                                             |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                         |                                                             |              | <b>50</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                         |                                                             |              | <b>69</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                 | <b>Maneuver Area Requirement</b>                            |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                | <b>Kilometers (km x km = km<sup>2</sup>)</b>                | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                                            | 7 X 19 = 133                                                | 12           | 2                            | 2                          | 1181                    | 1630          |
| Offense                                                                                        | 4 X 15 = 60                                                 | 9            | 2                            | 2                          | 932                     | 1286          |
| Defense                                                                                        | 11 X 13=143                                                 | 8            | 2                            | 2                          | 808                     | 1115          |
| Retrograde                                                                                     | 6 X 13 = 78                                                 | 8            | 2                            | 2                          | 808                     | 1115          |
| Recon and Security                                                                             | Integral to all other missions. No separate space required. |              |                              |                            |                         |               |
| BDE Attack                                                                                     | 11 X 28 = 308                                               | 17           | 1                            | 5                          | 1531                    | 730           |
| <b>Totals</b>                                                                                  |                                                             |              |                              |                            | <b>5260</b>             | <b>5876</b>   |

**Table 2.2-4. SMA and Total Task Miles for the 2<sup>nd</sup> Armored Brigade, 4<sup>th</sup> ID (2/4ABCT)**

| <b>3<sup>rd</sup> Battalion / 16<sup>th</sup> Field Artillery Regiment (3/16 FA BN)</b>                              |                                                  |              |                                                    |                            |                         |               |
|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------|----------------------------------------------------|----------------------------|-------------------------|---------------|
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                  |              | <b>39</b>                                          |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>62</b>                                          |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b>                       | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                                                    |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Deliver Fires                                                                                                        | 15 X 31 = 465                                    | 19           | 2                                                  | 2                          | 1502                    | 2388          |
| Move                                                                                                                 | 3 X 15 = 45                                      | 9            | 2                                                  | 2                          | 727                     | 1156          |
| Survive                                                                                                              | 2 X 2 = 4                                        | 3            | 2                                                  | 2                          | 194                     | 309           |
| <b>Totals</b>                                                                                                        |                                                  |              |                                                    |                            | <b>2423</b>             | <b>3853</b>   |
| <b>52<sup>nd</sup> Engineer Battalion (52<sup>nd</sup> En Bn)</b>                                                    |                                                  |              |                                                    |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                  |              | <b>43 (including 16 dozers)</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>109 (including 3 Stryker NBC Vehicles)</b>      |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b>                       | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                                                    |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Mobility Operations                                                                                                  | 12 X 16 = 192                                    | 10           | 1                                                  | 1                          | 427                     | 1084          |
| Countermobility Ops.                                                                                                 | 12 X 16 = 192                                    | 10           | 1                                                  | 1                          | 427                     | 1084          |
| Survivability Ops.                                                                                                   | 12 X 16 = 192                                    | 10           | 1                                                  | 1                          | 427                     | 1084          |
| General Engineering                                                                                                  | 12 X 16 = 192                                    | 10           | 1                                                  | 1                          | 427                     | 1084          |
| Fight as Engineers                                                                                                   | 6 X 17 = 102                                     | 11           | 1                                                  | 1                          | 454                     | 1151          |
| <b>Totals</b>                                                                                                        |                                                  |              |                                                    |                            | <b>2162</b>             | <b>5487</b>   |
| <b>204<sup>th</sup> Brigade Support Battalion (204<sup>th</sup> BSB)</b>                                             |                                                  |              |                                                    |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                  |              | <b>36 (including 36 tracked recovery vehicles)</b> |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>325</b>                                         |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b>                       | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                                                    |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Tactical Operations                                                                                                  | 6 X 20 = 120                                     | 12           | 2                                                  | 5                          | 895                     | 8080          |
| Note* Majority of wheeled vehicles convoy on roadways and remain stationary once at the Battalion Support Area (BSA) |                                                  |              |                                                    |                            |                         |               |
| <b>2nd Armored BCT Headquarters and Headquarters Battalion (2ABCT HHBN)</b>                                          |                                                  |              |                                                    |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                  |              | <b>6</b>                                           |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>39</b>                                          |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b>                       | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                                                    |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Movement to Contact                                                                                                  | 7 X 19 = 133                                     | 12           | 2                                                  | 2                          | 142                     | 921           |
| Offense                                                                                                              | 4 X 15 = 60                                      | 9            | 2                                                  | 2                          | 112                     | 727           |
| Defense                                                                                                              | 11 X 13 = 143                                    | 8            | 2                                                  | 2                          | 97                      | 630           |
| Retrograde                                                                                                           | 6 X 13 = 78                                      | 8            | 2                                                  | 2                          | 97                      | 630           |

**Table 2.2-4. SMA and Total Task Miles for the 2<sup>nd</sup> Armored Brigade, 4<sup>th</sup> ID (2/4ABCT)**

|                                                                                           |                                                             |       |                            |   |       |      |
|-------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------|----------------------------|---|-------|------|
| Recon and Security                                                                        | Integral to all other missions. No separate space required. |       |                            |   |       |      |
| BDE Attack                                                                                | 11 X 28 = 208                                               | 17    | 1                          | 5 | 1531  | 731  |
| Totals                                                                                    |                                                             |       |                            |   | 1979  | 3639 |
| TOTAL BRIGADE MILES AT PCMS                                                               |                                                             |       |                            |   |       |      |
| 2 <sup>nd</sup> Armored Brigade Combat Team / 4 <sup>th</sup> Infantry Division (2/4ABCT) |                                                             |       |                            |   |       |      |
| Total Tracked Vehicles                                                                    |                                                             | 350   | Total Wheeled Vehicles     |   | 688   |      |
| Total Task Miles - Tracked                                                                |                                                             | 28907 | Total Task Miles - Wheeled |   | 34663 |      |
| Total Task Miles                                                                          |                                                             |       |                            |   | 63570 |      |

Note: Distance values have been rounded to the nearest mile.

As is the case currently, ABCT training would be authorized in all mechanized training areas except where restricted (see Figure 2.2-9). Dig permits would be required for units wanting to dig defilade positions for armor vehicles. Implementation of Proposed Action Alternative 1A would require accommodations be made for the training needs of an additional maneuver battalion, which could include additional training time, space or both. It is anticipated, however, that each ABCT would continue to train within the afforded approximate 25-day training window at PCMS.

### 2.2.2.3 Infantry Brigade Combat Team Training

Soldier and equipment density, and training intensity during IBCT-level training events as a result of the Army's 2013 decision to augment its remaining IBCT with an additional maneuver battalion increased IBCT maneuver battalion levels from two to three. Therefore, the additional training of about 750 Soldiers occurs per iteration of IBCT-level training at PCMS. Soldier and equipment densities per iteration of IBCT-level training would have the potential to increase to approximately 4,300 Soldiers and to approximately 800 wheeled vehicles, predominantly high mobility multipurpose wheeled vehicles (HMMWVs), and 6 tracked vehicles (dozers) if the unit trained with all its resources at one time.

The Total Task Miles for a typical exercise by the IBCT at PCMS would total about 40,637 miles (Table 2.2-5).

**Table 2.2-5. SMA Requirements for the 4<sup>th</sup> Infantry Brigade, 4<sup>th</sup> ID (4/4IBCT)**

| <b>4<sup>th</sup> Infantry Brigade Combat Team / 4<sup>th</sup> Infantry Division (4IBCT)</b> |                                                  |              |                              |                            |                         |               |
|-----------------------------------------------------------------------------------------------|--------------------------------------------------|--------------|------------------------------|----------------------------|-------------------------|---------------|
| <b>1<sup>st</sup> Battalion / 12<sup>th</sup> Infantry Regiment (1/12 INF BN)</b>             |                                                  |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                        |                                                  |              | <b>0</b>                     |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                        |                                                  |              | <b>70</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                               | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Offense                                                                                       | 12 X 8 = 96                                      | 8            | 2                            | 2                          | 0                       | 1044          |
| Defense                                                                                       | 12 X 6 = 72                                      | 8            | 2                            | 2                          | 0                       | 1044          |
| Retrograde                                                                                    | 12 X 10 = 120                                    | 8            | 2                            | 2                          | 0                       | 1044          |
| Stability                                                                                     | 8 X 8 = 64                                       | 5            | 2                            | 2                          | 0                       | 696           |
| Support                                                                                       | 8 X 8 = 64                                       | 5            | 2                            | 2                          | 0                       | 696           |
| <b>Totals</b>                                                                                 |                                                  |              |                              |                            | <b>0</b>                | <b>4524</b>   |
| <b>2<sup>nd</sup> Battalion / 12<sup>th</sup> Infantry Regiment ( 2/12 INF BN)</b>            |                                                  |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                        |                                                  |              | <b>0</b>                     |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                        |                                                  |              | <b>70</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                               | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Offense                                                                                       | 12 X 8 = 96                                      | 8            | 2                            | 2                          | 0                       | 1044          |
| Defense                                                                                       | 12 X 6 = 72                                      | 8            | 2                            | 2                          | 0                       | 1044          |
| Retrograde                                                                                    | 12 X 10 = 120                                    | 8            | 2                            | 2                          | 0                       | 1044          |
| Stability                                                                                     | 8 X 8 = 64                                       | 5            | 2                            | 2                          | 0                       | 696           |
| Support                                                                                       | 8 X 8 = 64                                       | 5            | 2                            | 2                          | 0                       | 696           |
| <b>Totals</b>                                                                                 |                                                  |              |                              |                            | <b>0</b>                | <b>4524</b>   |
| <b>1<sup>st</sup> Battalion / 22<sup>nd</sup> Infantry Regiment (1/22 INF BN)</b>             |                                                  |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                        |                                                  |              | <b>0</b>                     |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                        |                                                  |              | <b>70</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                               | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Offense                                                                                       | 12 X 8 = 96                                      | 7.46         | 2                            | 2                          | 0                       | 1044          |
| Defense                                                                                       | 12 X 6 = 72                                      | 7.46         | 2                            | 2                          | 0                       | 1044          |
| Retrograde                                                                                    | 12 X 10 = 120                                    | 7.46         | 2                            | 2                          | 0                       | 1044          |
| Stability                                                                                     | 8 X 8 = 64                                       | 4.97         | 2                            | 2                          | 0                       | 696           |
| Support                                                                                       | 8 X 8 = 64                                       | 4.97         | 2                            | 2                          | 0                       | 696           |
| <b>Totals</b>                                                                                 |                                                  |              |                              |                            | <b>0</b>                | <b>4524</b>   |



**Table 2.2-5. SMA Requirements for the 4<sup>th</sup> Infantry Brigade, 4<sup>th</sup> ID (4/4IBCT)**

| <b>3<sup>rd</sup> Squadron / 61<sup>st</sup> Cavalry Regiment ( 3/61 CAV)</b>           |                                                  |              |                                       |                            |                         |               |
|-----------------------------------------------------------------------------------------|--------------------------------------------------|--------------|---------------------------------------|----------------------------|-------------------------|---------------|
| <b>Total Tracked Vehicles Assigned</b>                                                  |                                                  |              | <b>0</b>                              |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                  |                                                  |              | <b>77</b>                             |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                          | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b>          | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                         | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                                       |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Recon & Security                                                                        | 2 X 10 = 20                                      | 6            | 2                                     | 2                          | 0                       | 956           |
| Offense                                                                                 | 2 X 10 = 20                                      | 6            | 2                                     | 2                          | 0                       | 956           |
| Defense                                                                                 | 2 X 10 = 20                                      | 6            | 2                                     | 2                          | 0                       | 956           |
| Retrograde                                                                              | 2 X 10 = 20                                      | 6            | 2                                     | 2                          | 0                       | 956           |
| Stability                                                                               | 2 X 10 = 20                                      | 6            | 2                                     | 2                          | 0                       | 956           |
| Support                                                                                 | 2 X 10 = 20                                      | 6            | 2                                     | 2                          | 0                       | 956           |
| <b>Totals</b>                                                                           |                                                  |              |                                       |                            | <b>0</b>                | <b>5736</b>   |
| <b>2<sup>nd</sup> Battalion / 77<sup>th</sup> Field Artillery Regiment (2/77 FA BN)</b> |                                                  |              |                                       |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                  |                                                  |              | <b>0</b>                              |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                  |                                                  |              | <b>147</b>                            |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                          | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b>          | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                         | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                                       |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Deliver Fires                                                                           | 4 X 20 = 80                                      | 12           | 2                                     | 2                          | 0                       | 3654          |
| Move                                                                                    | 3 X 15 = 45                                      | 9            | 2                                     | 2                          | 0                       | 2740          |
| Survive                                                                                 | 2 X 2 = 4                                        | 3            | 2                                     | 2                          | 0                       | 732           |
| <b>Totals</b>                                                                           |                                                  |              |                                       |                            | <b>0</b>                | <b>7126</b>   |
| <b>299<sup>th</sup> Brigade Engineer Battalion (299th BEB)</b>                          |                                                  |              |                                       |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                  |                                                  |              | <b>12 (Track vehicles are dozers)</b> |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                  |                                                  |              | <b>138</b>                            |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                          | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b>          | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                         | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                                       |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Mobility Operations                                                                     | 12 X 16 = 192                                    | 10           | 1                                     | 1                          | 119                     | 1372          |
| Counter mobility Ops.                                                                   | 12 X 16 = 192                                    | 10           | 1                                     | 1                          | 119                     | 1372          |
| Survivability Ops.                                                                      | 12 X 16 = 192                                    | 10           | 1                                     | 1                          | 119                     | 1372          |
| General Engineering                                                                     | 12 X 16 = 192                                    | 10           | 1                                     | 1                          | 119                     | 1372          |
| Fight as Engineers                                                                      | 6 X 17 = 102                                     | 11           | 1                                     | 1                          | 127                     | 1458          |
| <b>Totals</b>                                                                           |                                                  |              |                                       |                            | <b>603</b>              | <b>6946</b>   |

**Table 2.2-5. SMA Requirements for the 4<sup>th</sup> Infantry Brigade, 4<sup>th</sup> ID (4/4IBCT)**

| <b>704<sup>th</sup> Brigade Support Battalion (704<sup>th</sup> BSB)</b>                                             |                                                  |              |                              |                            |                         |               |
|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------|------------------------------|----------------------------|-------------------------|---------------|
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                  |              | <b>0</b>                     |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>369*</b>                  |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Tactical Operations                                                                                                  | 6 X 20 = 120                                     | 12           | 1                            | 5                          | 0                       | 4587          |
| Note* Majority of wheeled vehicles convoy on roadways and remain stationary once at the Battalion Support Area (BSA) |                                                  |              |                              |                            |                         |               |
| <b>4<sup>th</sup> IBCT Headquarters and Headquarters Battalion (4<sup>th</sup> BCT HHBN)</b>                         |                                                  |              |                              |                            |                         |               |
| <b>Total Tracked Vehicles Assigned</b>                                                                               |                                                  |              | <b>0</b>                     |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>32</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Tracked</b>          | <b>Trucks</b> |
| Offense                                                                                                              | 12 X 8 = 96                                      | 8            | 2                            | 2                          | 0                       | 477           |
| Defense                                                                                                              | 12 X 6 = 72                                      | 8            | 2                            | 2                          | 0                       | 477           |
| Retrograde                                                                                                           | 12 X 10 = 120                                    | 8            | 2                            | 2                          | 0                       | 477           |
| Stability                                                                                                            | 8 X 8 = 64                                       | 5            | 2                            | 2                          | 0                       | 318           |
| Support                                                                                                              | 8 X 8 = 64                                       | 5            | 2                            | 2                          | 0                       | 318           |
| <b>Totals</b>                                                                                                        |                                                  |              |                              |                            | <b>0</b>                | <b>2067</b>   |
| <b>TOTAL BRIGADE MILES AT PCMS</b>                                                                                   |                                                  |              |                              |                            |                         |               |
| <b>4<sup>th</sup> Infantry Brigade Combat Team / 4<sup>th</sup> Infantry Division (4/4 IBCT)</b>                     |                                                  |              |                              |                            |                         |               |
| <b>TRACKED VEHICLES</b>                                                                                              |                                                  | 603          | <b>WHEELED VEHICLES</b>      |                            | 40034                   |               |

Note: Distance values have been rounded to the nearest mile.

Historically, IBCTs have only trained at Fort Carson due to individual unit flexibilities, smaller training area requirements, and availability of dismounted training areas. It is also more cost-effective to train dismounted troops at Fort Carson than to transport them to PCMS. No recent IBCT-level training event has occurred at PCMS to demonstrate how it would conduct unit missions. With the recognition that training requirements may change, warranting a need to transport Soldiers to PCMS for IBCT training, the Proposed Action includes conducting one IBCT training event up to one time per year at PCMS.

Two IBCT-size training events occurred at Fort Carson in 2011, which could be used to project training trends at PCMS if they were to occur. Between July and August 2011, one IBCT conducted a collective 26-day training event at Fort Carson to train individual companies and platoons (see Table 2.2-6). Only six days were used to conduct actual maneuver training, five of which were used by maneuver battalion companies between July 27 and 31, 2011. One half of each day was used by a different light infantry company to conduct dismounted maneuvers. Based on the concept of the operation, each infantry company started at the same end of the training lane and advanced until it reached its final objective. Collectively, there were only six iterations of light infantry company movements through an approximate 6-square-kilometer area totaling 36 square kilometers of light impact overall for the training event.

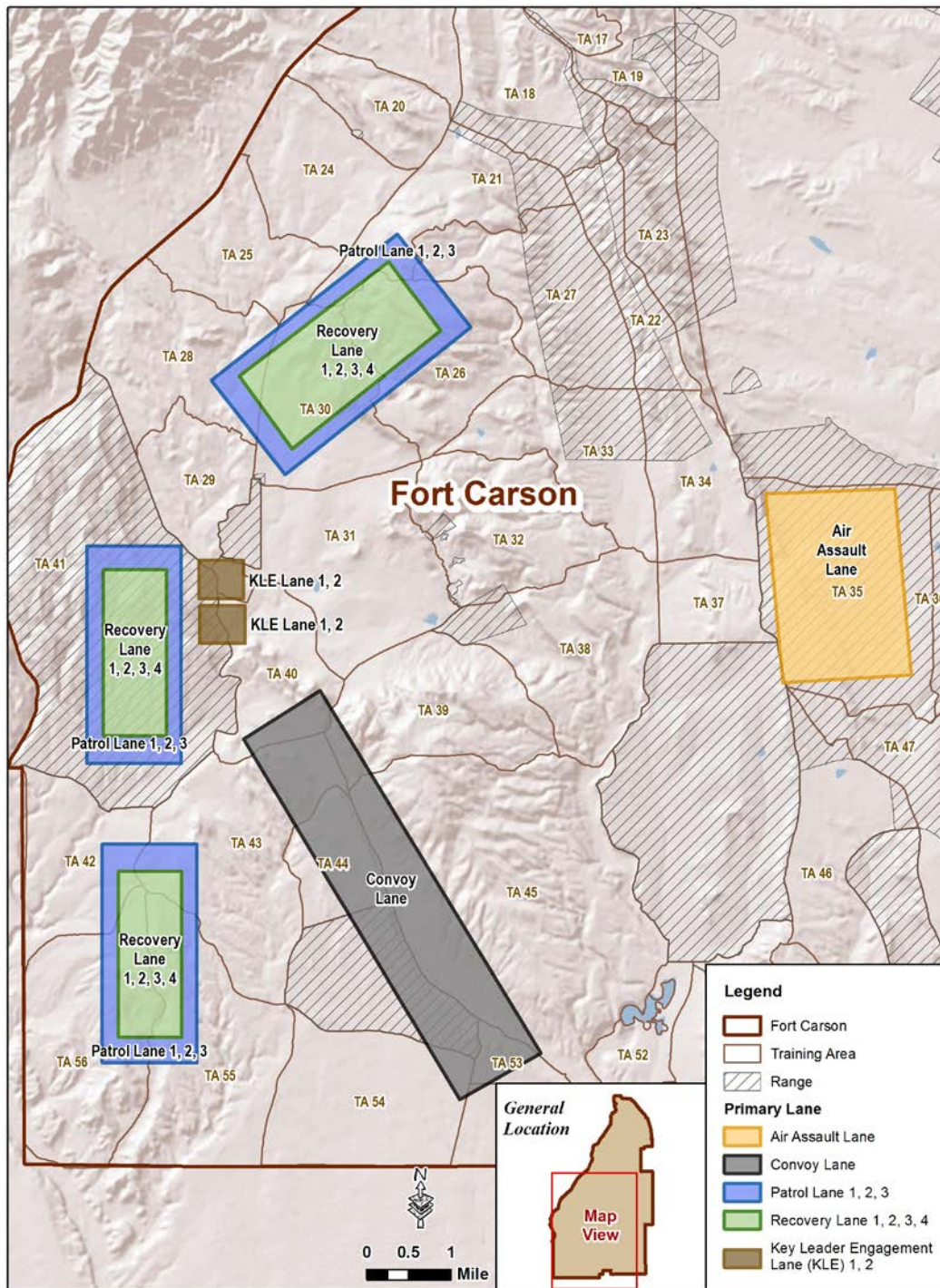
**Table 2.2-6. Historical IBCT Training Event Occurring at Fort Carson to Train Lethal Companies in Full Spectrum Combat Operations, July 19 – August 13, 2011**

| Activity                     | July |    |    |    |    |    |    |    |    |    |    | August |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
|------------------------------|------|----|----|----|----|----|----|----|----|----|----|--------|----|---|---|---|---|---|---|---|---|---|----|----|----|----|
|                              | 19   | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30     | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| Setup                        |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
|                              |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
|                              |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Lane Validation              |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Deployment Window            |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Set                          |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Dismounted CALFEX (Maneuver) |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Training Ranges 143/147      |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Convoy                       |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Remedial TNG                 |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| Tear Down/ Recovery          |      |    |    |    |    |    |    |    |    |    |    |        |    |   |   |   |   |   |   |   |   |   |    |    |    |    |

The second IBCT-level training event occurring in 2011 built upon the previous one and focused on battalion-level training for six days in September. During this training event, maneuver companies operated simultaneously in three separate maneuver areas. Maneuver companies moved through each patrol area rotating to different lanes each day. For example, one company would move from a patrol lane located in the vicinity of Training Area 56, to Training Area 41 the next day, and then to Training Area 30 (see Figure 2.2-8). Based on the 2011 Fort Carson training events and the general training nature of IBCTs, approaches and durations for training are anticipated to be similar for IBCT training at PCMS.

Under Proposed Action Alternative 1A, IBCT training would be authorized in all training areas except where restricted. Also under this alternative, one IBCT-level training event would occur annually at PCMS.

Due to cover and concealment requirements, and the nature of close combat and terrain, IBCTs would train mostly in dismount-only training areas (see Figure 2.2-9), and in a similar manner as described in the 2011 Fort Carson IBCT training event above. IBCT Soldiers could be transported via air mobile and/or ground mobile assets to these types of training areas using PCMS airspace or pre-existing roads/trails, respectively.



Note: This scenario is used for illustrative purposes.

**Figure 2.2-8. Representative Example Training Concept Graphic for IBCT-Level Training at Fort Carson**

#### 2.2.2.4 Stryker Brigade Combat Team Training

Fort Carson's SBCT has about 4,400 Soldiers, 336 Stryker vehicles, and 588 other wheeled vehicles. SBCTs have more combat vehicles conducting maneuver training than ABCTs because there are more Strykers than M1 tanks and Bradley Fighting Vehicles in an ABCT configuration. The eight-wheeled Strykers (about 20 tons) are lighter vehicles than the M1 tanks (67.6 tons) and Bradley Fighting Vehicles (27.6 tons) they would be replacing.

The Stryker vehicle has approximately 12 times better fuel mileage than the M1 tanks and Bradley Fighting Vehicles of an ABCT. Even though there are more combat vehicles in the SBCT than the ABCT, the amount of fuel consumed each year by the SBCT will be less. This will reduce emissions of both conventional fuel combustion products and greenhouse gases.

SBCTs are considered "medium infantry" and balance combined arms capabilities with significant mobility. Designed around the Stryker wheeled armor combat system in several variants, the SBCT has considerable operational reach. It is more deployable than the ABCT and has greater tactical mobility, protection, and firepower than the IBCT. SBCTs fight primarily as a dismounted infantry formation. The SBCT includes military intelligence, signal, engineering, antitank, artillery, reconnaissance, and sustainment elements. This design lets SBCTs commit combined arms elements down to company-level in urban and other complex terrain against a wide range of opponents.

SBCTs are new to Fort Carson. It is anticipated that they would conduct brigade-level training events for similar durations as other BCTs, approximately 25 days, once per year at PCMS. SBCT vehicles would primarily stay on roads and trails until they reach their objective and conduct dismounted training similar to IBCTs.

The Total Task Miles for a typical exercise by the SBCT at PCMS would total 54,363 miles (Table 2.2-7).

**Table 2.2-7. SMA Requirements for the 1<sup>st</sup> Stryker Brigade, 4<sup>th</sup> ID (1SBCT)**

| 1st Stryker Brigade Combat Team / 4 <sup>th</sup> Infantry Division (1 SBCT) |                                                             |       |                       |                     |                  |        |
|------------------------------------------------------------------------------|-------------------------------------------------------------|-------|-----------------------|---------------------|------------------|--------|
| 4 <sup>th</sup> Battalion / 9 <sup>th</sup> Infantry Regiment (4/9 INF BN)   |                                                             |       |                       |                     |                  |        |
| Total Stryker Vehicles Assigned                                              |                                                             |       | 74                    |                     |                  |        |
| Total Wheeled Vehicles Assigned                                              |                                                             |       | 35                    |                     |                  |        |
| Mission Essential Tasks                                                      | Maneuver Area Requirement                                   |       | Task Repetitions PCMS | Days per Repetition | Total Task Miles |        |
|                                                                              | Kilometers (km x km = km <sup>2</sup> )                     | Miles |                       |                     | Stryker          | Trucks |
| Intelligence, Surveillance Recon (ISR)                                       | Integral to all other missions. No separate space required. |       |                       |                     |                  |        |
| Offense                                                                      | 13 X 16 = 208                                               | 10    | 2                     | 2                   | 1471             | 696    |
| Defense                                                                      | 14 X 20 = 280                                               | 12    | 2                     | 2                   | 1840             | 870    |
| Stability                                                                    | 8 X 8 = 64                                                  | 5     | 2                     | 2                   | 736              | 348    |
| Support                                                                      | 8 X 8 = 64                                                  | 5     | 2                     | 2                   | 736              | 348    |
| Totals                                                                       |                                                             |       |                       |                     | 4783             | 2262   |



**Table 2.2-7. SMA Requirements for the 1<sup>st</sup> Stryker Brigade, 4<sup>th</sup> ID (1SBCT)**

| 1 <sup>st</sup> Battalion / 38 <sup>th</sup> Infantry Regiment (1/38 INF BN) |                                                             |       |                       |                     |                  |        |
|------------------------------------------------------------------------------|-------------------------------------------------------------|-------|-----------------------|---------------------|------------------|--------|
| Total Stryker Vehicles Assigned                                              |                                                             |       | 74                    |                     |                  |        |
| Total Wheeled Vehicles Assigned                                              |                                                             |       | 35                    |                     |                  |        |
| Mission Essential Tasks                                                      | Maneuver Area Requirement                                   |       | Task Repetitions PCMS | Days per Repetition | Total Task Miles |        |
|                                                                              | Kilometers (km x km = km <sup>2</sup> )                     | Miles |                       |                     | Stryker          | Trucks |
| Intelligence, Surveillance Recon (ISR)                                       | Integral to all other missions. No separate space required. |       |                       |                     |                  |        |
| Offense                                                                      | 13 X 16 = 208                                               | 10    | 2                     | 2                   | 1471             | 696    |
| Defense                                                                      | 14 X 20 = 280                                               | 12    | 2                     | 2                   | 1840             | 870    |
| Stability                                                                    | 8 X 8 = 64                                                  | 5     | 2                     | 2                   | 736              | 348    |
| Support                                                                      | 8 X 8 = 64                                                  | 5     | 2                     | 2                   | 736              | 348    |
| Totals                                                                       |                                                             |       |                       |                     | 4783             | 2262   |
| 2 <sup>nd</sup> Battalion / 23 <sup>rd</sup> Infantry Regiment (2/23 INF BN) |                                                             |       |                       |                     |                  |        |
| Total Stryker Vehicles Assigned                                              |                                                             |       | 74                    |                     |                  |        |
| Total Wheeled Vehicles Assigned                                              |                                                             |       | 35                    |                     |                  |        |
| Mission Essential Tasks                                                      | Maneuver Area Requirement                                   |       | Task Repetitions PCMS | Days per Repetition | Total Task Miles |        |
|                                                                              | Kilometers (km x km = km <sup>2</sup> )                     | Miles |                       |                     | Stryker          | Trucks |
| Intelligence, Surveillance Recon (ISR)                                       | Integral to all other missions. No separate space required. |       |                       |                     |                  |        |
| Offense                                                                      | 13 X 16 = 208                                               | 10    | 2                     | 2                   | 1471             | 696    |
| Defense                                                                      | 14 X 20 = 280                                               | 12    | 2                     | 2                   | 1840             | 870    |
| Stability                                                                    | 8 X 8 = 64                                                  | 5     | 2                     | 2                   | 736              | 348    |
| Support                                                                      | 8 X 8 = 64                                                  | 5     | 2                     | 2                   | 736              | 348    |
| Totals                                                                       |                                                             |       |                       |                     | 4783             | 2262   |
| 2 <sup>nd</sup> Squadron / 1 <sup>st</sup> Cavalry Regiment (2/1 CAV)        |                                                             |       |                       |                     |                  |        |
| Total Stryker Vehicles Assigned                                              |                                                             |       | 65                    |                     |                  |        |
| Total Wheeled Vehicles Assigned                                              |                                                             |       | 27                    |                     |                  |        |
| Mission Essential Tasks                                                      | Maneuver Area Requirement                                   |       | Task Repetitions PCMS | Days per Repetition | Total Task Miles |        |
|                                                                              | Kilometers (km x km = km <sup>2</sup> )                     | Miles |                       |                     | Stryker          | Trucks |
| Recon                                                                        | 12 X 30 = 360                                               | 19    | 2                     | 2                   | 2423             | 1007   |
| Security                                                                     | 12 X 30 = 360                                               | 19    | 2                     | 2                   | 2423             | 1007   |
| Defense                                                                      | 4 X 15 = 60                                                 | 9     | 2                     | 2                   | 1212             | 503    |
| Offense                                                                      | 2 X 13 = 26                                                 | 8     | 2                     | 2                   | 1050             | 436    |
| Totals                                                                       |                                                             |       |                       |                     | 7108             | 2953   |

**Table 2.2-7. SMA Requirements for the 1<sup>st</sup> Stryker Brigade, 4<sup>th</sup> ID (1SBCT)**

| <b>4<sup>th</sup> Battalion / 42<sup>nd</sup> Field Artillery Regiment (4/42 FA BN)</b>                              |                                                  |              |                              |                            |                         |               |
|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------|------------------------------|----------------------------|-------------------------|---------------|
| <b>Total Stryker Vehicles Assigned</b>                                                                               |                                                  |              | <b>14</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>111</b>                   |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Stryker</b>          | <b>Trucks</b> |
| Deliver Fires                                                                                                        | 15 X 31 = 465                                    | 19           | 2                            | 2                          | 539                     | 4276          |
| Move                                                                                                                 | 3 X 15 = 45                                      | 9            | 2                            | 2                          | 261                     | 2069          |
| Survive                                                                                                              | 2 X 2 = 4                                        | 3            | 2                            | 2                          | 70                      | 553           |
| <b>Totals</b>                                                                                                        |                                                  |              |                              |                            | <b>870</b>              | <b>6898</b>   |
| <b>299<sup>th</sup> Brigade Engineer Battalion (299th BEB)</b>                                                       |                                                  |              |                              |                            |                         |               |
| <b>Total Stryker Vehicles Assigned</b>                                                                               |                                                  |              | <b>31</b>                    |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>119</b>                   |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Stryker</b>          | <b>Trucks</b> |
| Mobility Operations                                                                                                  | 12 X 16 = 192                                    | 10           | 1                            | 1                          | 308                     | 1183          |
| Countermobility Ops.                                                                                                 | 12 X 16 = 192                                    | 10           | 1                            | 1                          | 308                     | 1183          |
| Survivability Ops.                                                                                                   | 12 X 16 = 192                                    | 10           | 1                            | 1                          | 308                     | 1183          |
| General Engineering                                                                                                  | 12 X 16 = 192                                    | 10           | 1                            | 1                          | 308                     | 1183          |
| Fight as Engineers                                                                                                   | 6 X 17 = 102                                     | 11           | 1                            | 1                          | 327                     | 1257          |
| <b>Totals</b>                                                                                                        |                                                  |              |                              |                            | <b>1559</b>             | <b>5989</b>   |
| <b>4<sup>th</sup> Brigade Support Battalion (4<sup>th</sup> BSB)</b>                                                 |                                                  |              |                              |                            |                         |               |
| <b>Total Stryker Vehicles Assigned</b>                                                                               |                                                  |              | <b>0</b>                     |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>434*</b>                  |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Stryker</b>          | <b>Trucks</b> |
| Tactical Operations                                                                                                  | 6 X 20 = 120k                                    | 12           | 1                            | 5                          | 0                       | 5395          |
| Note* Majority of wheeled vehicles convoy on roadways and remain stationary once at the Battalion Support Area (BSA) |                                                  |              |                              |                            |                         |               |
| <b>1<sup>st</sup> Stryker Brigade Headquarters and Headquarters Battalion (1SBCT HHBN)</b>                           |                                                  |              |                              |                            |                         |               |
| <b>Total Stryker Vehicles Assigned</b>                                                                               |                                                  |              | <b>4</b>                     |                            |                         |               |
| <b>Total Wheeled Vehicles Assigned</b>                                                                               |                                                  |              | <b>34</b>                    |                            |                         |               |
| <b>Mission Essential Tasks</b>                                                                                       | <b>Maneuver Area Requirement</b>                 |              | <b>Task Repetitions PCMS</b> | <b>Days per Repetition</b> | <b>Total Task Miles</b> |               |
|                                                                                                                      | <b>Kilometers<br/>(km x km = km<sup>2</sup>)</b> | <b>Miles</b> |                              |                            | <b>Stryker</b>          | <b>Trucks</b> |

**Table 2.2-7. SMA Requirements for the 1<sup>st</sup> Stryker Brigade, 4<sup>th</sup> ID (1SBCT)**

| Intelligence,<br>Surveillance Recon<br>(ISR)                                                  | Integral to all other missions. No separate space required. |               |   |   |            |             |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------|---|---|------------|-------------|
| Offense                                                                                       | 13 X 16 = 208                                               | 10            | 2 | 2 | 80         | 676         |
| Defense                                                                                       | 14 X 20 = 280                                               | 12            | 2 | 2 | 99         | 845         |
| Stability                                                                                     | 8 X 8 = 64                                                  | 5             | 2 | 2 | 40         | 338         |
| Support                                                                                       | 8 X 8 = 64                                                  | 5             | 2 | 2 | 40         | 338         |
| <b>Totals</b>                                                                                 |                                                             |               |   |   | <b>259</b> | <b>2197</b> |
| <b>TOTAL BRIGADE MILES AT PCMS</b>                                                            |                                                             |               |   |   |            |             |
| <b>1<sup>st</sup> Stryker Brigade Combat Team / 4<sup>th</sup> Infantry Division (1 SBCT)</b> |                                                             |               |   |   |            |             |
| <b>Stryker VEHICLES</b>                                                                       | 24145                                                       | <b>TRUCKS</b> |   |   | 30218      |             |

Note: Distance values have been rounded to the nearest mile.

### 2.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS

Proposed Action Alternative 1B incorporates the BCT training elements of Proposed Action Alternative 1A and add enhanced readiness training using the following new training activities and infrastructure components at PCMS:

- Aviation Gunnery (non-explosive) and Flare Training
- Electronic Jamming Systems
- Laser Targeting
- Demolitions Training
- Unmanned Aerial Systems Training
- Unmanned Ground Vehicle Training
- Airspace Reclassification
- Drop Zone Development

#### 2.2.3.1 Aviation Gunnery (non-explosive) and Flare Training

Under Proposed Action Alternative 1B, the Army would incorporate additional non-explosive aviation gunnery and flare training at PCMS. Aviation gunnery actions currently include firing 20/30-milimeter (mm) and 5.56-mm rounds from aviation platforms on Range 9. Under Alternative 1B, the Army would fire 2.75-inch training rockets at targets from a hover position at temporary targets with a surface danger zone (SDZ) (designated area in which potential hazards exist). As the firing of these training rounds would cause potential hazards, two proposed new SDZs (see Figure 2.2-9) and airspace reclassification would be required. Current SDZs do not meet DA Pamphlet (PAM) 385-63, *Range Safety*, criteria to fire these training rounds. These SDZs would be established for AH64 and OH58 rotary wing aircraft to fire Blue Spear 2.75-inch rockets at targets from hover position. Temporary targets would be placed during training and would be removed once training were completed. Running fire and dive fire



would not be allowed as there is insufficient room for the larger SDZ associated with those activities. SDZs would be based on an angle of fire between 2 and 18 degrees from an altitude of between 20 and 300 feet above ground level (AGL), as defined by 4<sup>th</sup> ID G3 Aviation. Targeting would be visual by both ground and aerial laser designators.

Approximately three to five annual aviation gunnery events would be anticipated to occur using the proposed SDZs under Proposed Action Alternative 1B. According to the 2011 Fort Carson Combat Aviation Brigade Stationing Implementation Environmental Assessment, an aviation task force would deploy from Fort Carson to PCMS one time per year for each BCT stationed at Fort Carson. This aviation task force would provide approximately two weeks of support for each BCT brigade-level maneuver rotation. There are three Active Component BCTs stationed at Fort Carson. The CAB would also support other brigade-level units training at PCMS. Accordingly, six weeks (1.5 months) of aviation task force support of brigade-level maneuvers at PCMS have been assumed to be required each year in order to support air-ground integration operations at the brigade-level. In addition to supporting brigade-level training, the Combat Aviation Brigade would support some battalion-level ground unit training with smaller aviation elements.

Flare training would also be enabled under this alternative. Flares are passive, defensive countermeasures deployed by military aircraft. Their purpose is to confuse and divert radar-guided or infrared-guided anti-aircraft missiles fired by other aircraft or from ground weapon systems. Under Proposed Action Alternative 1B, flare use would be allowed anywhere within PCMS airspace, provided that it is not deployed within 1 kilometer of the airspace perimeter, in wind conditions exceeding 25 knots, and over restricted land areas. These measures would prevent migration off PCMS and avoid impacts to adjacent airspace users. Flares are used to distract heat-seeking missiles. Most are magnesium pellets ejected from tubes to ignite in the wake behind the aircraft. These flares burn at temperatures above 2,000 °F, hotter than the jet engine nozzles or exhaust and exhibit large amounts of infrared light. Confronted by these more conspicuous bursts of infrared energy, infrared-seeking missiles are decoyed away from the targeted aircraft to pursue the flares instead. Some countermeasure flares incorporate a small propulsion system to fire the flare on a level path that more convincingly simulates the flight of an aircraft to confuse sophisticated heat-seeking systems. Countermeasure flares are designed to burn out in within 3-5 seconds of employment and before reaching the ground to minimize fire hazard. According to the Air Force (USAF, 1997), flares must be dispatched at 1,500 feet AGL or greater for this occur. DPTMS Air Traffic Controllers and Unit Commanders would ensure aviation support units employ flares at or above this altitude at PCMS.

Use of flares would generate localized instances of illumination in the sky, which would be more noticeable during nighttime hours. Illumination would be comparable to a cluster of bright shooting stars depending on the amount of flares used during a training event lasting until the charge has burned off (typically less than 1 minute).

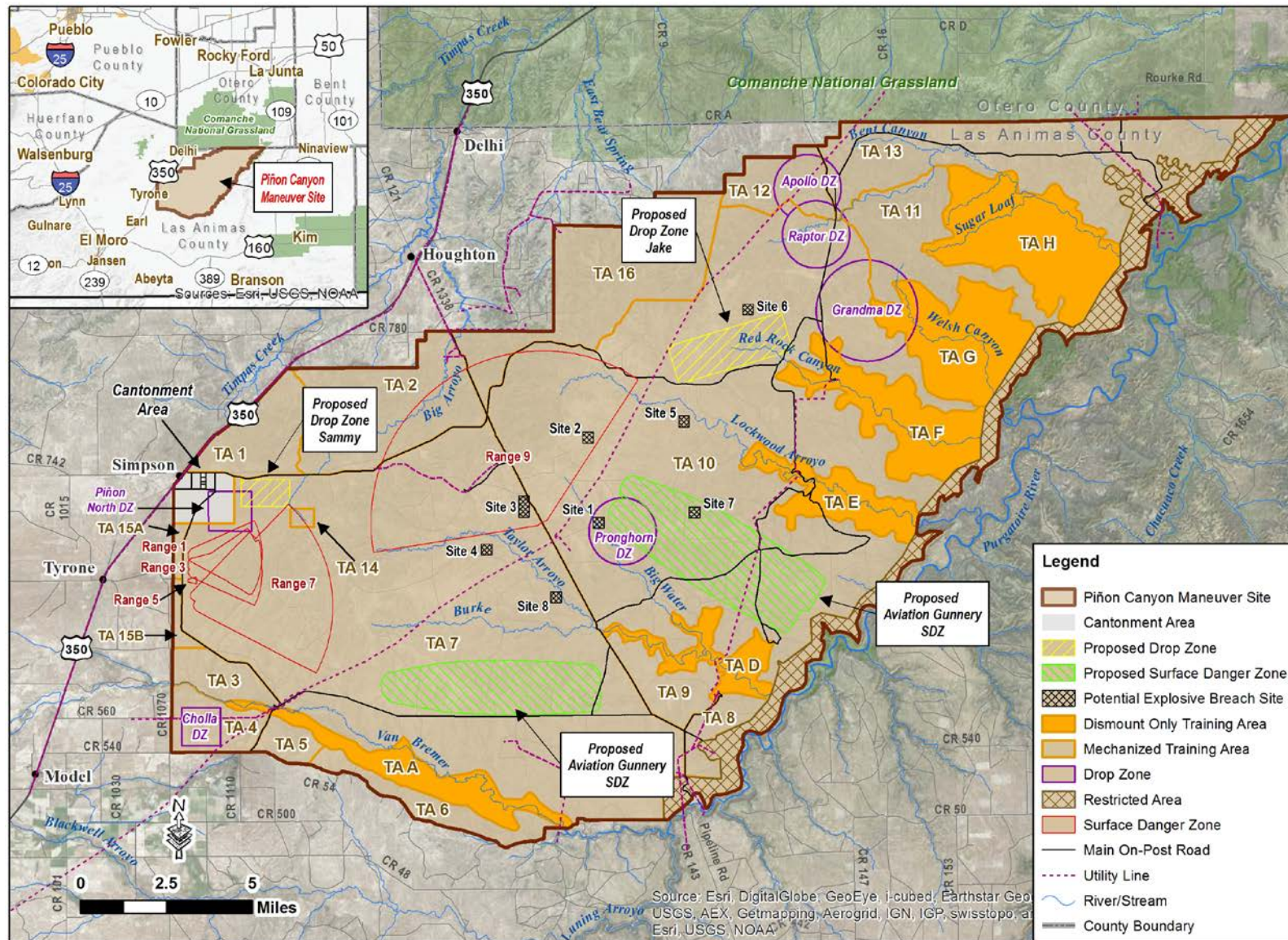


Figure 2.2-9. Proposed New Aviation Gunnery Surface Danger Zones and Drop Zones

### 2.2.3.2 Electronic Jamming Systems

Electronic Warfare (EW) training at PCMS would involve using precision electromagnetic jamming measures under Proposed Action Alternative 1B. Electromagnetic jamming systems are not to be confused with ultrasonic jamming systems, which jam or interfere with sound. Electromagnetic jamming is the deliberate radiation, re-radiation, or reflection of electromagnetic energy for the purpose of preventing or reducing an enemy's effective use of the electromagnetic spectrum, and with the intent of degrading or neutralizing the enemy's combat capability. Jamming equipment used would include vehicle-mounted and hand-held devices which would be primarily Radio Frequency inhibitors and countermeasures against Remote Controlled Improvised Explosive Devices (RCIEDs) and could also act as sensors to pinpoint the trigger location. Jamming systems provide a defensive bubble around the Soldiers to prevent a radio-controlled IED from being triggered. The effects of jamming only persist as long as the jammer itself is emitting and is in range to affect the target. Normally, these effects last a matter of seconds or minutes. DoD-approved frequencies would be used for this type of training at PCMS and would not interfere with civilian and commercial frequencies.

### 2.2.3.3 Laser Targeting

Class 3B and Class 4 lasers would be used throughout PCMS. Laser targeting training would involve proficiency training only to "paint" targets; no laser-guided weapons firing would occur. Laser targeting training at PCMS would involve:

- Laser target ranging and designation systems - provides accurate directional distance and vertical angle information for use in locating enemy targets. These systems may vary from hand-held to aircraft-mounted devices, but they all perform the same basic function. Once a target has been selected and accurately located, the laser designation capability is used to identify the specific targets.
- Laser acquisition devices - used to "sense" the reflected energy from laser designation devices. These devices are used in conjunction with laser designation systems to pinpoint targets or other specific items. Normally, laser acquisition devices are mounted on fixed-wing aircraft or helicopters.

Laser targeting systems would be employed by aircraft, hand-held and vehicular systems and would require the presence of a Laser Range Safety Officer during training events. Laser surface danger zones (LSDZs) would be generated during the mission planning phase. Units would develop a scenario depicting areas of operations and where they want to conduct laser operations. LSDZs would then be generated for that area and approved or disapproved by Range Operations. Due to potential eye safety hazards, RA would be required for the use of Class 3B and Class 4 lasers. Lasers would be used anywhere on-post and would not be visible.

### 2.2.3.4 Demolitions Training

Demolitions training would include using small explosives in eight proposed designated explosive breach sites, Training Areas 7 and 10 (see Figure 2.2-9), to provide realistic training for obstacle clearing and breaching under this Proposed Action Alternative. The Army uses demolitions while in both offensive and defensive postures in combat. Offensively, demolitions are used to penetrate through obstacles, structures, and enemy strongholds, for example. Defensively, demolitions can be used to deter the enemy through disabling avenues of approach, such as bridges and roads, and/or disrupting enemy communications through disabling communication infrastructures, for example.

Explosives used would include C4, TNT, plastic explosives, detonating cord, Bangalore torpedoes (explosive charges used to clear obstacles), blasting caps, timed fuses and igniters.

Individual explosives would not exceed 25-pounds each<sup>4</sup> and would require a maximum SDZ radius of 300 meters (984 feet) from the point of detonation. Currently, the only type of explosives training conducted at PCMS is limited to less than 0.5 pound using detonating cords to breach building doors.

The following factors were used for siting the proposed breach sites:

- No protected cultural property would be within any of the demolition training sites.
- Demolition training sites are more than 500 meters from the existing natural gas pipeline.
- Recommended sites are based on existing maneuver corridors and locations utilized for breaching operations during previous training exercises to minimize off-road disturbances from vehicles.
- Breach locations would be standardized at 500 by 500 meters (1,640 by 1,640 feet) except for the one on Range 9 (established convoy live-fire range) which would be 500 by 1000 meters (1,640 by 3,280 feet). These site sizes allow for operational and training flexibility within that space and will be identified by Military Grid Reference System (MGRS) grid locations at each corner.
- Sites selected needed to meet the following additional criteria: 1) proximity to protected cultural sites (farther is better); 2) ability to canalize maneuvering forces based on terrain (more terrain features to support defense is better); and 3) concealment along avenues of approach (e.g., presence of low vs high ground, gullies, and creek beds).

Prior to training, a checklist would be completed and verified by Directorate of Plans, Training, Mobilization and Security (DPTMS) and Directorate of Public Works – Environmental Division (DPW-E). The checklist would include grid coordinates, SDZ overlay, sensitive resources within the area (e.g., protected cultural sites or protected species), and all necessary consultation/approvals including Section 106 of the National Historic Preservation Act (NHPA) and Section 7 of the Endangered Species Act (ESA).

### **2.2.3.5 Unmanned Aerial Systems Training**

The Army would potentially increase Shadow UAS training instances within existing airspace above PCMS. Fort Carson's Combat Aviation Brigade received three additional Shadow UAS platoons in 2014, which have 3 Shadow UASs per platoon, collectively totaling an increase of 12 overall. These systems are being more frequently incorporated into training exercises to support realistic training.

### **2.2.3.6 Unmanned Ground Vehicle Training**

Lightweight class (500 pounds or less) of UGV use during training events are proposed as part of Proposed Action Alternative 1B (See Figure 2.2-10). These vehicles would primarily be employed on existing roads and trails at PCMS as they are used for reconnaissance, route clearance and counter IED tasks. They would also be integrated into BCT-level training at PCMS. Small unit-level training with these systems at PCMS is not anticipated as would be accomplished at Fort Carson or other local training areas.

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<sup>4</sup> Initially, Soldiers may train with smaller explosive charges.



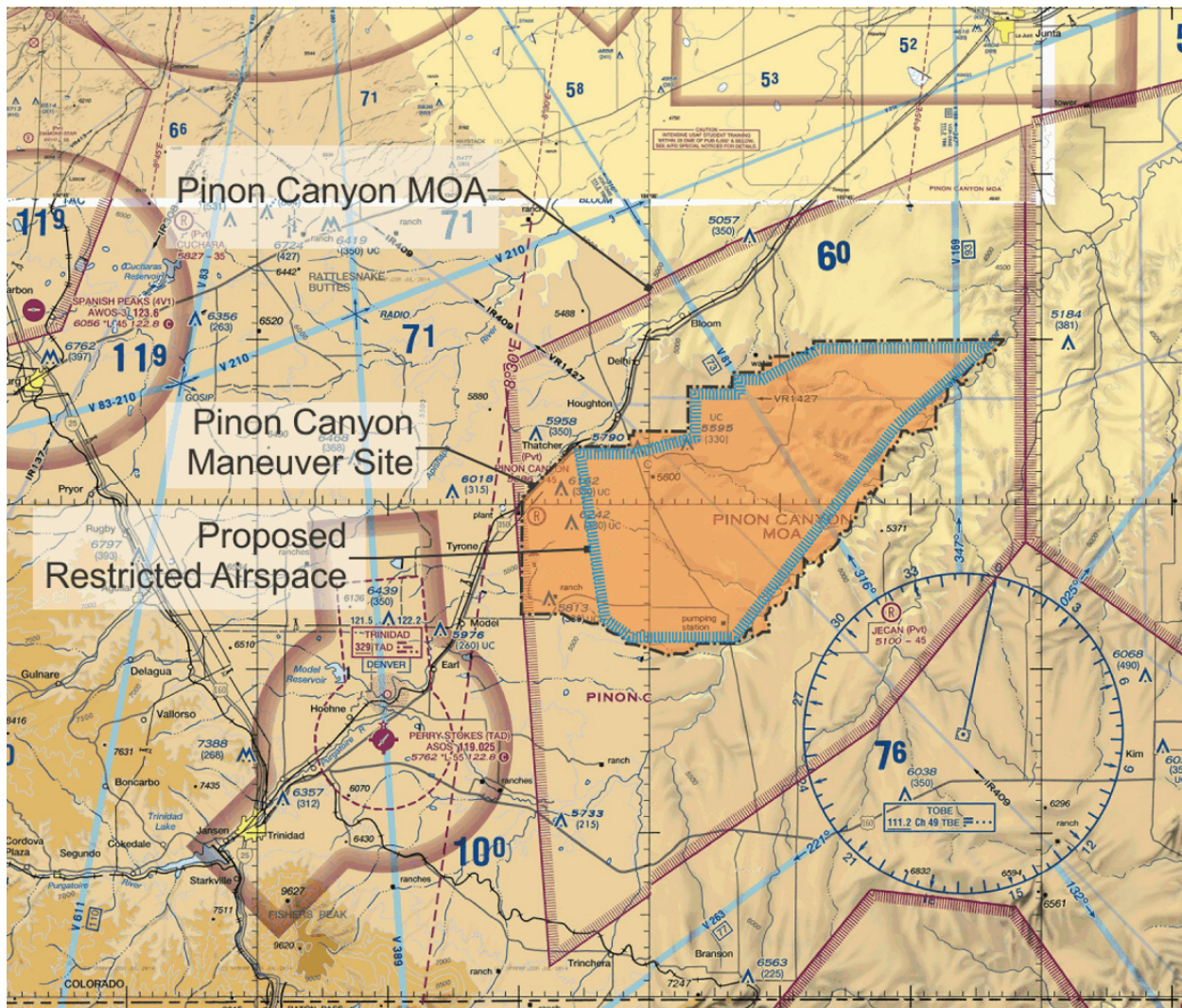


**Figure 2.2-10. Unmanned Ground Vehicle**

### **2.2.3.7 Airspace Reclassification**

Under Proposed Action Alternative 1B, a request to the FAA has been made to reclassify a portion of the existing Piñon Canyon Military Operations Area (MOA) as RA. The RA would have a published time continuous use (4-5 weeks long, 4-5 rotations per year) with a published altitude of surface to 10,000 feet above MSL. Figure 2.2-11 depicts the proposed RA boundary relative to PCMS. The Controlling Agency would be the FAA Denver Air Route Traffic Control Center (ARTCC) and the Using Agency would be the Commander, U.S. Army, Fort Carson, CO. The SUA reclassification and rulemaking proposal would overlie the existing PCMS to provide an increased ground-to-air, air-to-ground, and air-to-air battle-space environment that similarly matches the existing ground, air-to-air, and air-to-ground special use airspace at Fort Carson's R2601A-D maneuver area capabilities. Air Force fast movers would provide urban warfare mission and close air support for Combined Arms Training cycles (4-5 training cycles per year). Activation would occur only when needed in order to support operations that pose a hazard to commercial and general aviation such as aviation gunnery training. Training activities needing RA activation would be scheduled in advance, resulting in notification to the Denver ARTCC to activate the RA during specific times announced via Notices to Airmen (NOTAM).





**Figure 2.2-11. Sectional Depicting Proposed Restricted Area Relative to PCMS**

RA is required to allow many of the same weapon systems to be used at PCMS that are currently utilized on Fort Carson R2601, with the exception of mortar training which would not be conducted. Artillery, stinger missile, and Hellfire missiles would not be fired at PCMS. This action is necessary for proposed aviation gunnery as this activity is deemed hazardous to non-participating aircraft that may be in the area. Other activities of this Proposed Action Alternative would also benefit from activation of an RA, including flare training, electronic jamming, laser targeting, and UAS flights. Activation of the RA would allow for safe training flights of UAS within the RA over PCMS without the need to file for certificates of authorization (COAs) with the FAA. Currently, UAS activities may be conducted inside the MOA without RA by use of alternative safety measures identified in the COA, including the use of ground observers and chase planes to fulfill see and avoid requirements when operating outside of controlled airspace. This alternative measure requires close coordination with the Civil Air Patrol to provide a chase plane for each UAS employed at PCMS when conditions prevent the use of ground observers. Chase planes fly from the Trinidad Airport to a linkup site over PCMS where the pilot and spotter maintain visual contact with and at a safe distance from the UAS. The chase plane follows the UAS until training has concluded.

The following activities would occur below 10,000 feet MSL:

- Explosive Demolitions
- Small Arms Ranges
- 2.75" rockets (Aviation Gunnery)
- 20mm/30mm (Aviation on Range 9)
- Lasers from ground and manned/unmanned aviation platforms
- Smoke and Obscurants
- Unmanned Aviation Platforms
- Close Air Support (rotary and fixed wing)
- Personnel and Equipment Parachute Drops

Fort Carson will coordinate with Denver Center to mitigate potential impacts. This may include establishment of a buffer zone around PCMS footprint perimeter to ensure all hazardous operations and potential impacts remain within the PCMS footprint.

#### **2.2.3.8 Drop Zone Development**

Under Proposed Action Alternative 1B, the Army would establish two additional DZs (DZ Jake and DZ Sammy) within PCMS (see Figure 2.2-9). The proposed DZ Jake is 2,541 acres and the Proposed DZ Sammy is 723 acres. The following drop activities would potentially occur at these new locations: container delivery systems/container ramp load/container release systems (CDS/CRL/CRS); personnel (PER); heavy equipment (HE); military free fall (MFF); simulated airdrop training bundles (SATB); combat rubber/rigid raiding craft (CRRC); high speed low level aerial delivery systems (HSLADS); and high velocity container delivery systems (HVCDS). Both DZs would be established by unmarked survey points on the ground and would provide new areas for unimpeded drops, free of obstructions and landing hazards such as woody growth, fewer Seibert markings (stake mounted) and fences that occur at the existing DZs. While removal of woody vegetation is not currently planned, potential hazards (e.g., tree stumps or other vertical obstacles) that could create a hazard for the troops utilizing the DZ would be removed.

### **2.3 Alternatives Considered and Eliminated from Detailed Study**

An alternative to consider closure of PCMS was suggested by various persons in the scoping process. The alternative of closure of PCMS, however, was not retained for full evaluation. This would not meet the purpose and need of the proposed action because it would eliminate the ability of Fort Carson Soldiers to execute brigade-level training at their home station. It would eliminate a training asset Fort Carson has had for over 30 years. This would require Fort Carson to acquire another area in which to train its brigades, and this would be extremely difficult, time-consuming, and expensive. Closure also involves a complicated screening process and could require NEPA analysis of reuse scenarios. Even if closure of PCMS met the purpose and need of the proposed action, such analysis would exceed the scope of this EIS.

An alternative considered but dismissed was to provide integrated, combined arms training for Fort Carson units at other military installations, such as the National Training Center and Joint Readiness Training Center. This alternative would not be practical. Such an action would result in lost training time for Soldiers and inefficient use of appropriations (funds) for training due to increased costs that would result from extensive logistics and transportation. According the

1 1980 EIS, it was over one day's travel time to travel to White Sands, New Mexico, the nearest  
2 location identified as capable of facilitating the desired brigade-level training. Since then, it has  
3 also been discovered that resources at White Sands, to include ice age animal tracks, would  
4 severely limit heavy maneuver training. It was also approximately four times the expense, and is  
5 expected to incur this same ratio in current relative costs. Requiring basic skills to be learned  
6 away from the home station would also unnecessarily increase the time Soldiers are separated  
7 from their Families, potentially having a negative impact on Soldier and Family quality of life.

8 At one point about 10 years ago, Fort Carson had a proposal to expand PCMS. In explaining  
9 this proposal, the Army stated that PCMS at its current size could not support the Army's  
10 requirements. At that time, the Army's plan called for introducing additional live-fire ranges and  
11 two battle area complexes (very large automated ranges). PCMS was then envisioned to  
12 develop into a regional training area, offering extensive training opportunities to units visiting  
13 from places other than Fort Carson. The Army has abandoned the expansion effort and with it  
14 the plans to enhance the training at PCMS at such a large scale. PCMS is large enough to  
15 support the training proposed in this EIS.

16 Another alternative considered but dismissed was to provide Soldiers with simulated combined  
17 arms training. This alternative, however, would not prepare Soldiers for deployment as  
18 technology has not advanced sufficiently to enable simulations alone to provide Soldiers and  
19 units adequate training to meet doctrinal training readiness standards.

## 20 **2.4 Preferred Alternative**

21 The Army's Preferred Alternative is Alternative 1B which would enable maneuver and other  
22 readiness training to be conducted at PCMS using new tactics and equipment to support  
23 brigade-size units stationed at Fort Carson, now and in the future.

## 24 **2.5 Existing PCMS Training Protocol and Range Management**

### 25 **2.5.1 Scheduling of Training Activities**

26 Units coordinate training events up to three years in advance of their proposed training  
27 exercises using the Range Facility Management Support System (RFMSS), which is an  
28 electronic scheduling system. Units ranging in size from small teams to full brigades all use  
29 RFMSS to schedule training. Units smaller than battalion-level must coordinate with their  
30 respective battalions to enter training requests into RFMSS. Battalion- and brigade-level events  
31 can be input directly. Before a unit and training area may be placed in a reserved status, several  
32 criteria must be met. First, all training must be vetted through the chain of command prior to  
33 populating RFMSS. Once approved, units must submit a concept of operations and a range  
34 clearance plan as attachments within the system. The concept of operations describes the  
35 specific mission-essential tasks to be accomplished, as well as where, when, and how they will  
36 be accomplished with respect to each training area. Range clearance plans describe how the  
37 unit intends to phase its recovery operations from the training site. This includes identifying how  
38 the unit will perform cleanup duties, if potentially applicable, and maneuver damage activities.

39 Simultaneous to unit coordination efforts, Range Operations determines if there are any pending  
40 environmental or safety issues with regard to each requested training site. Range Operations  
41 will put the training request into a conditional reserve status if there are issues pending  
42 additional review and analysis. Potential environmental issues are discussed in the following  
43 sections. Once all coordination efforts are made and determined acceptable, Range Operations  
44 places the unit's request in a reserved status for the training areas desired. Monthly in-progress  
45 reviews (IPRs) are subsequently conducted between Range Operations and the requesting unit



to synchronize and refine planning efforts. As training events near execution, IPRs are conducted every two weeks for large battalion or brigade exercises.

### **2.5.1.1 Coordination Considerations**

The Army considers several factors when implementing its training mission and when annually selecting sites for training exercises. Some of the factors considered include climatic, biological, and cultural resource conditions in the training areas, and troop safety. It is in the Army's interest to sustain the land at PCMS for future training activities. In addition, measures to ensure the safety of troops during training also include conditions that protect natural and cultural resources. On the basis of this process, the Army effectively incorporates mitigation for environmental impacts into the implementation of its training mission and to maintain sound stewardship practices in meeting environmental regulation and law (see Section 2.5.1.2, Evaluation and Rotation of Training Areas). The extensive coordination regarding use of the training areas includes maintaining the training areas in a way that meets the goals of the training mission as well as manages the training areas to avoid environmental impacts that would compromise the training mission. This coordination is documented in several ways, including the preparation of a risk management assessment and live-fire certification. The entities noted in Section 2.5.1 are involved in developing pre- and post-training planning and assessment.

The process for implementing the training mission includes extensive coordination with the Integrated Training Area Management (ITAM) Coordinator, DPW-E, DPTMS Range Division, Unit Commanders, Troop Commanders, and other entities. These other entities include, but are not limited to, Military Police, the RFMSS, Fort Carson Safety Officer, reserve component units, National Guard units, the U.S. Air Force Air Liaison officer, and Air Route Traffic Control.

DPW-E evaluates in collaboration with Range Division training operations or land use that could have adverse impacts to the environment and provides information and recommendations regarding environmental resources and environmental requirements prior to training events.

ITAM integrates mission requirements and land maintenance to optimize training. The ITAM program monitors training activities, institutes projects to minimize training damage, and educates units to limit damage to training lands. ITAM is a dynamic program for collection and review of maneuver data and land conditions.

Other parties external to PCMS are also contacted regularly to ensure that safety concerns are factored into training exercises. For example, the Army might need to contact the Denver Air Traffic Control Center regarding a specific training exercise being planned.

### **2.5.1.2 Evaluation and Rotation of Training Areas**

Prior to use for training, DPTMS Range Division inspects training areas and evaluates them in accordance with Fort Carson Regulations (FC Regs) 350-10, *Maneuver Damage Control Program*, and 385-63, *Firing Ammunition for Training, Target Practice, Administration and Control of Ranges and Training Areas*. During each rotation, DPTMS Range Division Inspectors might observe the daily training and interact with military training personnel and unit leaders. During these interactions, or at other times as necessary, resource and environmental management professionals make recommendations to unit leaders about maneuver damage, soil moisture conditions, wildlife locations, locations of cultural resources, and other locations where sensitive environmental resources could be adversely affected by training. Units then make necessary adjustments to training exercises after being fully advised, giving full consideration to training, safety, weather, the environment, and other concerns, as applicable.

After each training rotation, DPTMS Range Division inspects the areas according to FC Regs 350-10 and 385-63 and completes Fort Carson Form 1313-6, *Training Area Clearance Plan Inspection Sheet*. These forms are completed in lieu of formal environmental impact focused after action reports. The inspection sheet addresses tasks that units must complete before they may officially clear a training area. These tasks include:

- Mitigate ruts and ridges greater than boot height
- Fill in excavations
- Identify and mitigate for severed trees
- Remove trash
- Mitigate damage to tank trails and roads
- Cleanup grey water pits
- Remove any wire, stakes or brass
- Coordinate for removal of portalets
- Cleanup any remaining spill residue
- Ensure all trash and debris are placed in dumpsters
- Mitigate any excessive maneuver damage

All training areas must be classified in satisfactory condition, assessing the training area based on adherence to the tasks above before DPTMS will approve final clearance and relieve units of any additional cleanup or rehabilitation responsibilities. Other units choose to perform maneuver damage recovery activities in-house using their own Soldiers, equipment, and resources. Regardless of training area recovery method used, Unit Commanders are responsible for range clearance. To strengthen this requirement, Fort Carson requires Unit Commanders, maneuver damage control officers, Fort Carson Range Officers, and the training area Officer in Charge and/or Range Safety Officer to all sign the checklists before units are formally cleared of each training area.

Because the condition of training lands is highly variable, depending on the amount and type of training and the climatic conditions during training, the ITAM program does not set specific ratios for land rest to sustain training lands. Instead, the ITAM program provides a process by which the post directorates (primarily the G-3, DPTMS, DPW, and DPW-E) work together to provide input regarding the training needs and the environmental condition of the training lands. Environmental plans developed by DPW-E staff, in coordination with relevant regulatory agencies and approved by the Garrison Commander, are followed to manage environmental resources in a manner that complies with environmental laws and regulations and avoids unnecessary environmental damage. Typically, if an area is substantially damaged and is lacking vegetation, it will go into a rehabilitative state and is restricted from most uses until it has a minimum 65 to 70 percent vegetational coverage. Rotation of training areas involves placing training lands in “limited use” or “off limits” designation for a period of time to allow rehabilitation (also refer to Section 2.5.2.3). Recovery times can vary based on the extent of area damaged and environmental factors such as drought.

## **2.5.2 Protection of PCMS Resources**

Three Fort Carson directives primarily address environmental protection requirements at PCMS. These are FC Reg 200-1, *Environmental Quality - Environmental Management and Protection* (Fort Carson, 2013b), FC Reg 350-4, *Training, PCMS* (Fort Carson, 2011a), and FC Reg 350-10, *Maneuver Damage Control Program* (Fort Carson, 2011b). Collectively, these directives

assign environmental management responsibilities and establish procedures to ensure that units comply with all Federal, state, local, and Army requirements. This includes providing general, overarching guidance and policy, as in FC Reg 200-1, to the site-specific management requirements of PCMS. In addition, several long-term monitoring programs are in place at PCMS to monitor land conditions. The Range and Training Land Assessment (RTLA) program (USDA, 2001a) is a statistically-based program that primarily monitors vegetation but also monitors habitat composition. Other resources monitored at PCMS include stream flow (quantity and quality), and cultural resources. These data provide additional inputs to the suitability of lands for specific training exercises and are factored when training plans are developed.

#### **2.5.2.1 FC Reg 200-1**

FC Reg 200-1 describes both Fort Carson and PCMS full spectrum environmental program requirements and subsequent policies and procedures required to achieve/maintain conformance with Federal, state, local, and Fort Carson environmental policy requirements. Environmental topics addressed in FC Reg 200-1 include:

- Environmental Management System – outlining how the installation achieves its sustainability initiatives, as well as environmental and economic goals, while maintaining mission focus.
- National Environmental Policy Act – outlining installation NEPA compliance and mitigation requirements.
- Air Resources – outlining how installation operational decisions and activities are in accordance with applicable Federal, state, and local air quality regulations.
- Water Resources – outlining compliance of the Water Resources Program with drinking water, stormwater, and wastewater policies and regulations.
- Land Resources – outlining how the installation adheres to the garrison approved INRMP, DoD regulations, instructions, directives, policy guidance, and cooperative Federal and state agreements required by the Sikes Act for the management of wildlife and recreation on DoD lands.
- Pest Management – outlining policies, plans, and procedures for pest management and compliance.
- Cultural Resources – outlining compliance with all cultural resources laws and regulations to identify, evaluate, maintain, preserve, and protect all types of cultural resources, including Native American traditional cultural properties and sacred sites, while maintaining the largest possible area for military training.
- Pollution Prevention – outlining opportunities to reduce pollutants at the source by modifying administrative, maintenance, janitorial, and industrial processes. Also highlighting the use of best management practices regarding the procurement, use, handling, storage, transportation, and disposition of hazardous and toxic materials.
- Materials Management – outlining measures to reduce risk to public health and the environment by employing management controls and pollution prevention initiatives to comply with regulations and EOs.
- Integrated Solid Waste Management - outlining compliance with Federal and state regulations and identifying opportunities to reduce solid waste and principles for waste management.
- Environmental Cleanup – outlining protection of public health and the environment through proper management and remediation of sites where releases of hazardous materials have occurred.

- Storage Tanks – outlines protection of public health and the environment by properly managing storage tanks in accordance with Federal regulations.
- Oil and Hazardous Substances Spills – outlines policies for the storage of oil and hazardous substances and compliance with Federal-, state-, and DoD-mandated response, clean-up, reporting, and record keeping requirements.
- Energy – outlines installation policies for energy use and conservation in accordance with EOs and Army regulations.
- Operational Noise – outlines installation procedures to reduce noise to the maximum extent practicable by application of engineering noise reduction procedures, administrative control, and land use planning.
- Environmental Audits – outlines procedures for maintaining compliance with applicable Federal, state, and local regulations.

#### **2.5.2.2 FC Regulation 350-4**

FC Reg 350-4 is a comprehensive regulation that specifically prescribes policy, procedures, and responsibilities that are used to support range operations and training at PCMS. It applies to all units that train at PCMS. Specific topics addressed in the regulation that are of particular relevance and importance to this EIS include:

- Coordination of Training Events
- Responsibilities, Qualifications and Duties of Officer in Charge, Range Safety Officer, and Maneuver Damage Control Officer
- Facility Clearance Standards
- Recreational Fishing and Hunting
- Restricted/Limited-Use Areas
- Training Impacts on Surrounding Communities
- Maneuver Damage/Environmental Protection
- Fire Prevention and Response
- Training Exercise Planning and Execution

FC Reg 350-4 guidelines seek to reduce damage to soils, when at all possible, by limiting training to trails, roads, and dismounted operations when soils are wet using a color code system. Per FC 350-4:

*“b. Commanders are responsible to minimize damage to soils, vegetation, facilities, and roads downrange and to reduce unnecessary expenditures of limited resources. Commanders of training units must consider the following guidelines prior to mechanized training during inclement weather.*

*(1) Green - soils are dry (no restrictions).*

*(2) Amber - soils are becoming wet. Training should be limited to trails, roads, and dismounted operations.*

*(3) Red - vehicles are making significant tracks in the soil (3" deep). Training should be limited to movement on primary Main Supply Routes (MSR) and dismounted operations only.*

*c. Before training during red or amber conditions, the commander must consider the following issues:*

*(1) The necessity of training.*

(2) *The criticality of the mission.*

(3) *The current training status of the unit.*

(4) *The relevance of the training to upcoming operational missions.*

*d. Notification of green, amber, and red soil conditions are published daily by Range Control on soil conditions pertaining to PCMS."*

### **2.5.2.3 FC Reg 350-10**

FC 350-10 describes the Fort Carson and PCMS maneuver damage control program (MDCP), which is essentially comprised of the following elements:

- Education
- Prevention
- Reporting
- Correction and Repair
- Evaluation of Effectiveness

FC Reg 350-10, *Maneuver Damage Control Program*, provides Commanders guidance to evaluate the value of the intended training against the cost and possible environmental effects of maneuver damage. The regulation assists Commanders in this evaluation by providing information on the control of maneuver damage. The goal of the program is to comply with local, state, and Federal laws and regulations, and to maximize training opportunities while minimizing damage to the training lands. In addition, FC Reg 350-10, *Maneuver Damage Control Program*, prescribes procedures and policy for the control of maneuver damage. Similar to 350-4, this regulation encourages commanders to "Maximize the use of existing routes and trails. Avoid creating new routes and trails". This regulation also outlines the minimization of neutral steer turns which are more likely to "destroy vegetation, compact the soil, increase the probability of erosion and leave evidence of operations" (Fort Carson 2011b).

Military assembly areas, excavation training, and the movement of vehicles are the major sources of maneuver damage. As part of the MDCP, the following use areas were established within training areas in order to protect resources and for rehabilitation following maneuver training:

- **Limited-Use Areas** - Training areas are designated as limited-use areas following training events that would require rest and rehabilitation to provide for the sustainment of training lands. Units may drive through limited-use areas on existing routes or trails, and may conduct dismounted training off the routes. Units cannot dig, bivouac, or maneuver vehicles off the routes or trails in limited-use areas. The areas are surrounded by limited-use signs. These areas are the most impacted sites in the training areas, and are being rehabilitated for continued, sustainable training use or for other administrative reasons such as test, experimentation, and evaluation. Most limited-use areas are in limited-use status for three years, but are pulled out of this status (and placed back in dismounted-only or mechanized status) as soon as possible after the site has recovered and the vegetation can once again withstand military training.
- **Off-Limits Areas (Restricted Areas)** - Training in off-limits areas is prohibited. These areas are designated on overlays and are marked with off-limits signs. Some of these areas contain serious safety hazards and others are protected by Federal law (e.g., select cultural resources).
- **Dismounted-Only Training Areas** - Training in dismounted-only training areas must be limited to dismounted training activities only and all ground-disturbing activities must be

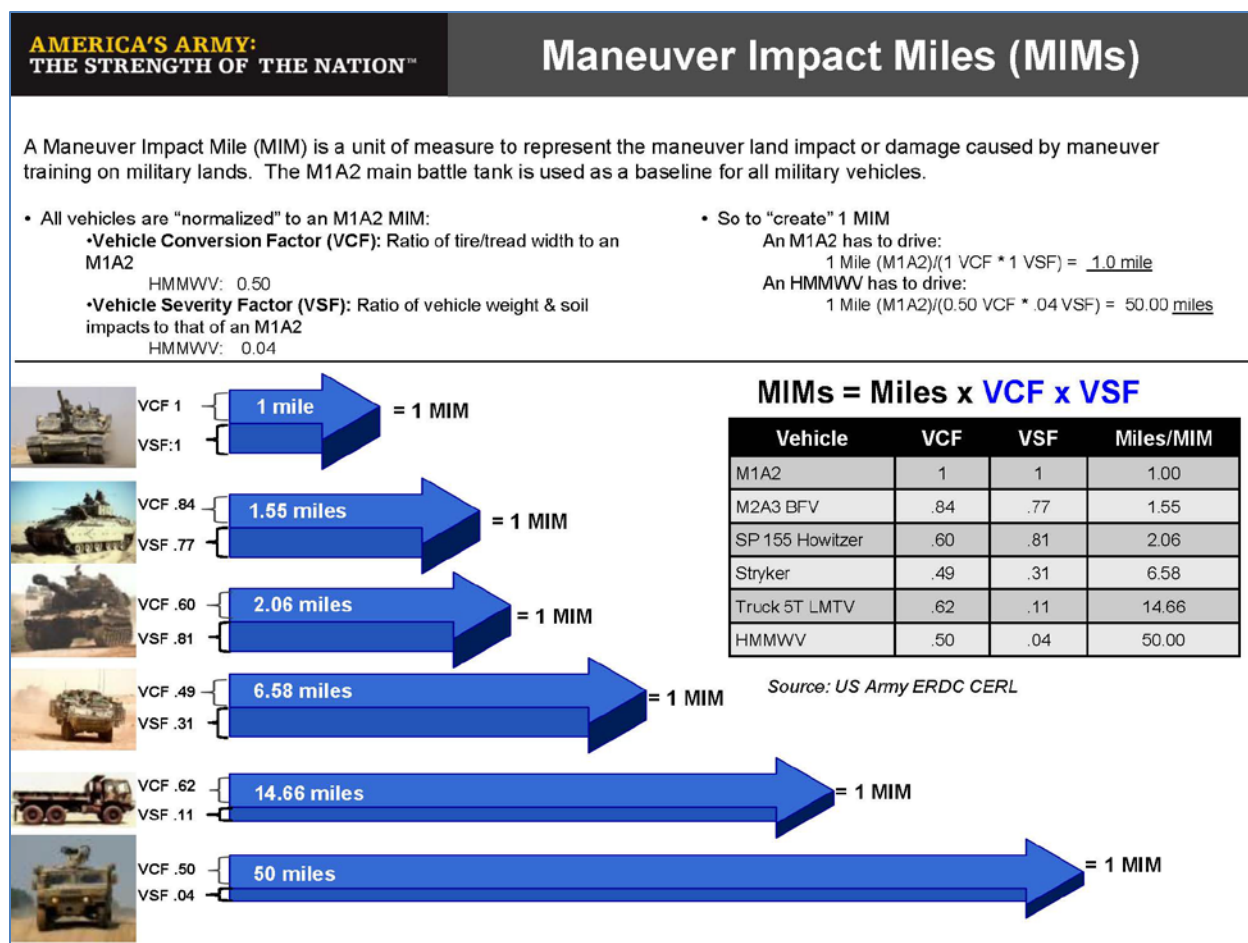
requested through DPTMS, Range Division for coordination and permission in advance of the training exercise. Vehicle traffic is restricted to existing routes and trails. Major dismounted-only training areas are designated with Letters A through H. Training areas with lettered designation are permanently restricted to dismounted-only training; mechanized-training areas (i.e., numbered training areas) can be temporarily downgraded to dismounted-only training following a maneuver exercise. Dismounted-only training areas are identified by the placement of "Seibert Stakes" and "Seibert Signs" that are commonly used at military installations to designate areas that should be avoided. On PCMS, Seibert Stakes/Signs mean "NO DIGGING and NO VEHICLE TRAFFIC."

### **2.5.3 Restoration and Rehabilitation of PCMS Training Lands**

#### **2.5.3.1 Maneuver Impact Miles**

The Army measures maneuver impacts on the land by applying the training event mileage to the vehicle track or wheel specifications to determine the footprint on the ground, and then considering the weight to determine impact to the soil, using the M1A2 (main battle tank) as a baseline for all military vehicles. Figure 2.5-1 shows how MIMs are calculated.

MIMs enable the Army to project the funds necessary for repairing potential maneuver damage. This funding allows the installations to plan (before the training occurs) for rehabilitation and managing maneuver/training damage (described in Section 2.5.3.2). The annual MIMs forecasted for Fort Carson's assigned BCT's are 354,159 MIMs. This correlates to the SMA and Total Task Miles because the total possible annual mileage of all 3 maneuver brigades at PCMS is 67,053 miles for tracked vehicles and 111,130 miles for trucks.



1 **Figure 2.5-1. Description of Maneuver Impact Miles (MIMs)**

2 A combined overall mileage of 178,173 would equate to less than half of the annual MIMs that  
3 are forecasted for Fort Carson's assigned BCTs.

4 As an example, the eight-wheeled Stryker's (about 20 tons) are lighter vehicles than the M1  
5 tanks (67.6 tons), and therefore, use less MIMs per mile driven. The Stryker's Vehicle  
6 Conversion Factor is .49 and its Vehicle Severity Factor is .31. Therefore, the Stryker can travel  
7 6.58 miles and have the same maneuver impact as an M1 Tank driving 1 mile.

### 8 **2.5.3.2 Recent Restoration and Rehabilitation at PCMS**

9 The most recent brigade-level training (2/4 ABCT) at PCMS was a 23-day event that occurred  
10 from February 20<sup>th</sup> to March 14<sup>th</sup>, 2013. Coordination and planning for the exercise began in  
11 October 2012. This included Section 106 consultation and coordination, and approval of the  
12 training footprint and digging sites prior to execution. The exercise involved 3,100 Soldiers and  
13 1,038 vehicles over 113,000 acres. During the maneuver training exercise (lasting 19 days),  
14 two inclement weather events occurred, one on February 23<sup>rd</sup> (three days into the event) which  
15 consisted of six to eight inches of snowfall and again on March 10<sup>th</sup> consisting of twelve to  
16 fourteen inches of snowfall. Both events were followed by much warmer weather, resulting in  
17 rapid snow melt and saturated soils. Army regulation required the BCT Commander to consult  
18 with the PCMS leaders for the environment and ranges to identify the potential adverse impacts  
19 to the training lands prior to either halting or continuing this unit training (see Section 2.5.2.2).



- 1 The BCT Commander made an informed decision to train based on unit readiness level and the  
2 criticality of follow-on mission requirements. This resulted in vehicle rutting and loss of  
3 vegetation on 1,400 acres of the approximately 113,000 acres that were utilized during the  
4 training event.
- 5 Based on the requirements of FC Regs 350-10 and 385-63, 2/4 ABCT used their organizational  
6 engineer and other equipment to bring approximately 200 acres of damaged training area back  
7 to previous grade. Fort Carson's ITAM program staff completed the remainder of the restoration  
8 efforts by fine grading, disking, drill-seeding and mulching the site. Figures 2.5-2 through 2.5-5  
9 depict damage and recovery over a 10-month period for one of the sites damaged by this  
10 training event.



**Figure 2.5-2. Heavily Churned Soil<sup>a</sup>  
Following a Training Event (March 2013)**



**Figure 2.5-3. Site During Rehabilitation<sup>b</sup>  
(October 2013)**



**Figure 2.5-4. Continuing Site Recovery  
(May 2014)**



**Figure 2.5-5. Continuing Site Recovery  
(July 2014)**

- 11 a. Photo of raw maneuver damage before rehabilitation efforts conducted.  
12 b. Photo of site after unit rough graded and ITAM fine graded, drill-seeded and mulched.



### 3 Affected Environment and Environmental Consequences

This chapter describes the impact assessment methodology, the affected environment (existing conditions), and the environmental consequences for the No Action Alternative and the Proposed Action alternatives (alternatives 1A and 1B). Section 3.1.1 provides a description of baseline and data sources used to prepare this EIS. A description of impact assessment methodology and thresholds of significance are discussed in Section 3.1.2.

#### 3.1 Impact Assessment Methodology

##### 3.1.1 Description of Data Sources

Besides the documents listed in Section 1.6, which contain baseline data on PCMS and information for day-to-day operations managed by Fort Carson, the following types of data were used to characterize the affected environment:

- Geographic Information System (GIS) data including land cover, vegetation, hydrology, soils, and cultural sites
- Aerial photography: U.S. Department of Agriculture (USDA) Digital Orthophoto for Las Animas County, published 2013
- Public information from databases and publications managed and authored by USEPA, CDPHE, U.S. Army Public Health Command [USAPHC], Natural Resources Conservation Service [NRCS], USGS, Colorado Department of Natural Resources, Colorado Heritage Program, USFWS, National Wetland Inventory [NWI], U.S. Census, Bureau of Economics, and Department of Transportation
- Additional publications, research, and surveys
- County Planning Department/county records/online databases and plans
- State, county, and local agencies and local chamber of commerce
- Interviews with PCMS subject matter experts (SMEs), including the Cultural Resources Program Manager, Wildlife Program Manager, Range Operations and ITAM Staff, and the Airspace Manager
- Agency consultation and coordination
- Scoping

##### 3.1.2 Approach for Analyzing Impacts

Context and intensity are taken into consideration in determining a potential impact's significance, as defined in 40 CFR Part 1508.27. The context means that the significance of an action must be analyzed in several contexts such as the affected region, the affected interests, and the locality. The intensity of a potential impact refers to the impact's severity and includes consideration of beneficial and adverse impacts, the level of controversy associated with a project's impacts on quality of the human environment, whether the action establishes a precedent for future actions with significant effects, the level of uncertainty about project impacts, and whether the action threatens to violate Federal, state, or local law requirements imposed for the protection of the environment. The severity of environmental impacts is characterized as none/negligible, minor, moderate, significant, or beneficial:

- None/Negligible – No measurable impacts are expected to occur. A negligible impact may locally alter the resource, but would not measurably change its function or character.
- Minor – Primarily short-term but measurable adverse impacts are expected. Impacts on the resource may be slight.
- Moderate – Noticeable adverse impacts that would have a measurable effect on a wide scale (e.g., outside the footprint of disturbance or on a landscape level). If moderate impacts are adverse, they would not exceed limits of applicable local, state, or Federal regulations.
- Significant – A significant impact may exceed limits of applicable local, state, or Federal regulations or would untenably alter the function or character of the resource. These impacts would be considered significant unless mitigable to a less-than-significant level.
- Beneficial – Impacts would benefit the resource/issue.

Impacts that range from none to moderate and beneficial are considered less than significant.

To maintain a consistent evaluation of impacts in this EIS and in accordance with the Army NEPA regulations, thresholds of significance were established for each resource. Although some thresholds have been designated based on legal or regulatory limits or requirements, others reflect discretionary judgment on the part of the Army in accomplishing its primary mission of military readiness, while also fulfilling its conservation stewardship responsibilities. Significance thresholds are summarized in Table 3.1-1 and are also discussed within each resource section.

A region of influence (ROI) was determined for each resource area and was based on the potential impacts to the affected resource. For example, the ROI may focus on the specific location of an alternative, or PCMS and surrounding area, or may include the entire watershed. Table 3.1-1 presents resource-specific ROIs and the relevant factors in evaluating the context and intensity of a potential impact to determine if the impacts may be significant. The ROI was generally limited to PCMS for the following VECs: biological resources, wetlands, soils, cultural resources, and hazardous and solid wastes, as these VECs are directly connected to specific existing conditions within the installation and proposed future activities. For the remaining VECs, the ROI was generally expanded to include larger geographic areas (e.g., airsheds for air quality, watersheds for surface waters, noise zones for characterization and assessment of the noise environment, adjacent land uses, off-post transportation networks for convoys between Fort Carson and PCMS, utility services, and regional airspace use for airspace).

Somewhat different terms were used to describe the ROI for cultural resources. The ROI for cultural resources is referred to as the “Area of Potential Effect” (APE), consistent with NHPA Section 106 review and Fort Carson’s Integrated Cultural Resources Management Plan (ICRMP). During cultural resource reviews, Fort Carson assesses adverse effects on the identified cultural resources based on criteria found in the ICRMP and in accordance with the Programmatic Agreement (PA) (refer to Section 3.8, Cultural Resources). The determination typically results in a ‘no adverse effect’ or an ‘adverse effect.’ For the purposes of this EIS, a determination of adverse effects to cultural resources would be considered significant.

**Table 3.1-1. Thresholds of Significance and Regions of Influence**

| Areas of Concerns                                                                                   | Region of Influence                                                                                                                                     | Threshold of Significance                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Land Use                                                                                            | Land use within PCMS boundaries and on adjacent properties.                                                                                             | <p>Impacts to land use would be considered significant if Army actions:</p> <ul style="list-style-type: none"> <li>• Are substantially incompatible with existing military land uses and land use designations or have major conflicts with Army land use plans, policies, or regulations.</li> <li>• Create a substantial land use conflict with off-post land use.</li> </ul>                             |
| Air Quality and GHG                                                                                 | Airshed and PCMS boundary for criteria pollutant and HAPs.                                                                                              | <p>Impacts to air quality and GHGs would be considered significant if Army actions:</p> <ul style="list-style-type: none"> <li>• Threaten the attainment status of the region.</li> <li>• Generate substantial GHG emissions (&gt;25,000 tons CO<sub>2</sub> equivalents per year).</li> </ul>                                                                                                              |
| Noise                                                                                               | Areas adjacent to and within PCMS.                                                                                                                      | <p>Impacts to the noise environment would be considered significant if Army actions:</p> <ul style="list-style-type: none"> <li>• Result in the violation of applicable Federal, state, or local noise ordinance.</li> <li>• Create incompatible land uses for areas with sensitive noise receptors outside the PCMS boundary.</li> <li>• Would be loud enough to threaten or harm human health.</li> </ul> |
| Geology and Soils                                                                                   | Soils and geological features within PCMS.                                                                                                              | <p>Impacts to geology and soils would be considered significant if Army actions cause:</p> <ul style="list-style-type: none"> <li>• The landscape being unsustainable for military training.</li> <li>• Excessive soil loss which permanently impairs plant growth.</li> <li>• Violation of Federal laws pertaining to this resource.</li> </ul>                                                            |
| Water Resources: Streams and Floodplains, Wetlands, Surface Water Quality, Groundwater and Aquifers | Watersheds, USACE jurisdictional "waters of the U.S.," or state-designated stream segments associated with PCMS, and groundwater aquifers beneath PCMS. | <p>Significant impacts would occur if Army actions</p> <ul style="list-style-type: none"> <li>• Result in a detrimental change of surface water impairment status. (Note: A TMDL for sediment has not been established for the Purgatoire River).</li> <li>• Result in an impairment to the use of groundwater aquifers.</li> </ul>                                                                         |

**Table 3.1-1. Thresholds of Significance and Regions of Influence**

| <b>Areas of Concerns</b>                                                                                                           | <b>Region of Influence</b>                                                                                 | <b>Threshold of Significance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Biological Resources:<br>Native Plant and Wildlife Species/<br>Communities, Protected Species, Invasive Species, and Wildland Fire | Biological resources within PCMS; species home range, local habitat, or migratory range intersecting PCMS. | Impacts to biological resources would be considered significant if Army actions cause: <ul style="list-style-type: none"> <li>• Substantial permanent conversion or net loss of habitat at the landscape scale.</li> <li>• Long-term loss or impairment of a substantial portion of local habitat (species-dependent).</li> <li>• Unpermitted or unlawful “take” of threatened and endangered species or species protected under the BGEPA and MBTA.</li> </ul>                                                                                                                                                                                                                                                                                                                      |
| Cultural Resources                                                                                                                 | Cultural resources within PCMS.                                                                            | Impacts to cultural resources would be considered significant if Army actions: <ul style="list-style-type: none"> <li>• Generate substantial concerns raised by Federally-recognized Native American Tribes regarding potential impacts to properties of religious and cultural significance to those Tribes or organizations.</li> <li>• Cause direct or indirect alteration of the characteristics that qualify a property for inclusion in the National Register of Historic Places (may include physical destruction, damage, alteration, removal, change in use or character within setting, neglect causing deterioration, transfer, lease, sale), and failure to follow existing the Programmatic Agreement with the SHPO.</li> <li>• Adversely impact cemeteries.</li> </ul> |
| Socioeconomics                                                                                                                     | Socioeconomic factors within PCMS and immediately surrounding communities and counties.                    | Socioeconomic impacts would be considered significant if Army actions cause: <ul style="list-style-type: none"> <li>• Substantial change to the sales volume, income, employment or population of the surrounding ROI.</li> <li>• Disproportionate adverse economic, social, or health impacts on minority or low-income populations.</li> <li>• Long-term substantial loss or displacement of recreational opportunities and resources relative to baseline.</li> <li>• Substantial disproportionate health or safety risk to children.</li> <li>• Substantial increased public safety hazard from military operations.</li> <li>• Substantial increase in demand for public services (e.g., fire protection, police enforcement, education, etc.)</li> </ul>                       |
| Traffic and Transportation                                                                                                         | Roads within PCMS, Fort Carson and PCMS convoy corridor, and public roadways near PCMS.                    | Significant impacts would occur if Army actions cause a reduction by more than two LOSs at roads and intersections within the ROI.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Table 3.1-1. Thresholds of Significance and Regions of Influence**

| <b>Areas of Concerns</b>                                    | <b>Region of Influence</b>                                                                 | <b>Threshold of Significance</b>                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Airspace                                                    | Airspace above PCMS and surrounding aviation assets.                                       | A significant impact to airspace would occur if Army actions that led to a violation of FAA regulations that affects aviation safety, or results in substantial infringement of private or commercial flight activity.                                                                        |
| Facilities and Utilities                                    | Facilities and Utilities within PCMS and immediately surrounding communities and counties. | Significant impacts would occur if Army actions were to cause long term or frequent impairment of utility service to local communities, homes, or businesses.                                                                                                                                 |
| Hazardous Materials, Hazardous Wastes, and Toxic Substances | Hazardous Materials, Hazardous Wastes, and Toxic Substances Management within PCMS.        | Significant impacts would occur when substantial additional risk to human health or safety would be attributable to Army actions, including direct human exposure, substantial increase in environmental contamination or violation of applicable Federal, state, DoD, and local regulations. |

BGEPA=Bald and Golden Eagle Protection Act; CO<sub>2</sub>=carbon dioxide; DoD=Department of Defense; FAA=Federal Aviation Administration; GHG=greenhouse gas; HAPs=hazardous air pollutants; LOS=level of service; MBTA=Migratory Bird Treaty Act; NAAQS=National Ambient Air Quality Standards; PCMS=Piñon Canyon Maneuver Site; ROI=region of influence; SHPO=State Historic Preservation Officer; USACE=U.S. Army Corps of Engineers

- 1 Quantitative and qualitative analyses have been used, as appropriate, in determining whether,
- 2 and the extent to which, a threshold would be exceeded. Based on the results of these
- 3 analyses, this EIS identifies whether a particular potential impact is anticipated to be adverse or
- 4 beneficial, and to what extent.

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## 3.2 Land Use

### 3.2.1 Affected Environment

#### 3.2.1.1 Overview

PCMS is an approximately 235,000-acre U.S. Army site used for training units stationed at, or otherwise associated with, Fort Carson. PCMS is located in southeastern Colorado in Las Animas County, approximately 150 miles southeast of Fort Carson. PCMS is bounded by U.S. 350 to the west, Purgatoire River Canyon to the east, Las Animas County Road 54 to the south, and Otero County to the north. Nearby cities include Trinidad to the southwest and La Junta to the northeast (see Figure 1.1-1).

#### 3.2.1.2 Land Use on PCMS

Land use on PCMS is divided into three primary categories: the cantonment area, training areas, and restricted areas. The cantonment area consists of developed land; the training areas consist of open land. See Section 3.2.1.4 for a description of restricted areas. Table 3.2-1 provides land use acreages at PCMS.

**Table 3.2-1. Land Use Acreages at PCMS**

| Land Use Component <sup>a,b</sup> | Acres  | Ranges/SDZs (acres)                                                                      | DZs (acres)                                                           |
|-----------------------------------|--------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Cantonment Area                   | 1,642  | 0                                                                                        | Piñon North – 449                                                     |
| Restricted Areas                  | 9,745  | 0                                                                                        | 0                                                                     |
| TA 1                              | 4,012  | 0                                                                                        | 0                                                                     |
| TA 2                              | 9,096  | Range 9 – 2,203                                                                          | 0                                                                     |
| TA 3                              | 2,047  | 0                                                                                        | 0                                                                     |
| TA 4                              | 2,633  | 0                                                                                        | Cholla – 803                                                          |
| TA 5                              | 1,148  | 0                                                                                        | 0                                                                     |
| TA 6                              | 2,796  | 0                                                                                        | 0                                                                     |
| TA 7                              | 63,645 | Range 1 – 1,719<br>Range 3 – 1,829<br>Range 5 – 20<br>Range 7 – 7,458<br>Range 9 – 8,041 | Piñon North – 479                                                     |
| TA 8                              | 1,740  | 0                                                                                        | 0                                                                     |
| TA 9                              | 2,746  | 0                                                                                        | 0                                                                     |
| TA 10                             | 65,849 | Range 9 – 8,038                                                                          | Apollo – 79<br>Grandma – 2,840<br>Pronghorn – 1,926<br>Raptor – 1,608 |
| TA 11                             | 6,627  | 0                                                                                        | Grandma – 601<br>Raptor – 14                                          |

**Table 3.2-1. Land Use Acreages at PCMS**

| <b>Land Use Component<sup>a,b</sup></b> | <b>Acres</b> | <b>Ranges/SDZs (acres)</b> | <b>DZs (acres)</b>             |
|-----------------------------------------|--------------|----------------------------|--------------------------------|
| TA 12                                   | 2,997        | 0                          | Apollo – 1,230<br>Raptor – 272 |
| TA 13                                   | 14,639       | 0                          | Apollo – 255<br>Raptor – 32    |
| TA 14                                   | 230          | Range 7 – 101              | 0                              |
| TA 15A                                  | 332          | 0                          | 0                              |
| TA 15B                                  | 473          | 0                          | 0                              |
| TA 16                                   | 10,781       | Range 9 – 621              | 0                              |
| TA A                                    | 3,994        | 0                          | 0                              |
| TA D                                    | 2,807        | 0                          | 0                              |
| TA E                                    | 3,708        | 0                          | 0                              |
| TA F                                    | 6,009        | 0                          | Grandma – 64                   |
| TA G                                    | 6,700        | 0                          | Grandma – 873                  |
| TA H                                    | 8,950        | 0                          | 0                              |

a. Numbered training areas are utilized for mechanized training. Lettered training areas are utilized for dismounted training.

b. There is no TA B or TA C designation at PCMS.

DZ=drop zone; SDZ=surface danger zone; TA=training area

The cantonment area provides limited, austere Soldier and support facilities (e.g., maintenance buildings, administrative buildings, storage, aviation support, etc.). Many facilities are classified as temporary structures. In addition, PCMS airfield and helipads are located in the cantonment area. Military training is restricted in this area. There are also several ranch houses on PCMS; however, these houses are vacant. Roadways and the transportation network, including the PCMS railhead located on the southern edge of the cantonment area, are discussed in Section 3.10, Traffic and Transportation.

The training areas consist of unimproved or open lands that are used for military training maneuvers and small-arms live-fire activities. The terrain at PCMS varies widely from open, rolling prairies to semi-arid, basaltic hills. To a large degree, the terrain defines the suitability of training activities that occur within the training areas; the training designations and restrictions are shown in Figure 3.2-1. PCMS is best used for battalion- and brigade-sized maneuvers, lane training, small-arms live-fire ranges, and force-on-force exercises, usually by mechanized infantry. The four main training land use types within the training areas are mechanized training, dismounted training, small-arms live-fire ranges, and restricted areas. DZs are also located within PCMS. Aviation activities at PCMS primarily consist of helicopter overflights, including low-level helicopter training associated with the Combat Aviation Brigade, and landings (see Section 3.11, Airspace).



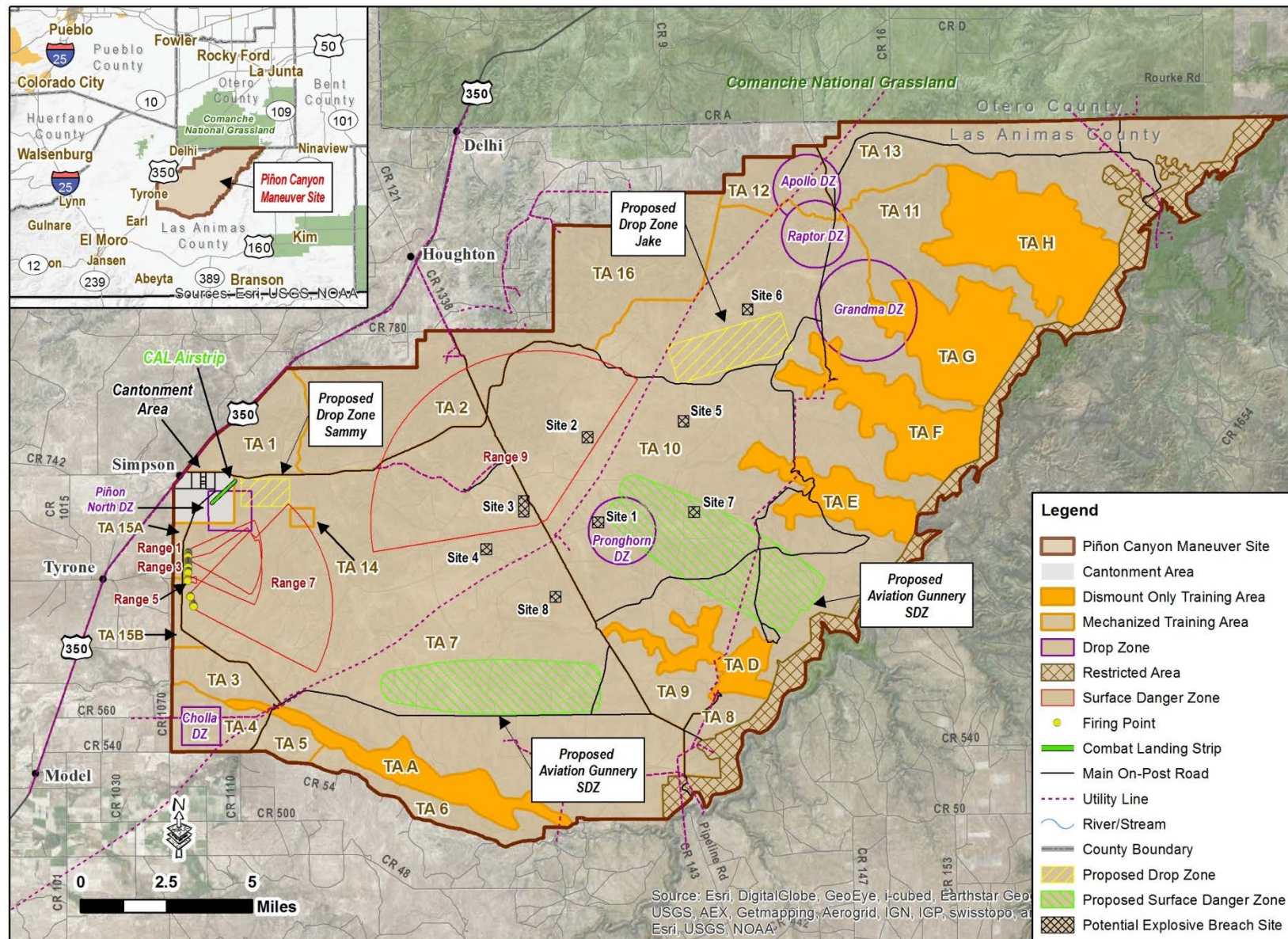


Figure 3.2-1. Land Use at PCMS

Mechanized training areas comprise the majority of training land available at PCMS. Mechanized training areas are appropriate (based on topography and other environmental conditions) for equipment, vehicles (e.g., wheeled and tracked vehicles), and personnel tactically maneuvering against an opposing force throughout the area. Equipment, vehicles, and personnel move through the area according to the requirements of training exercises, oftentimes resulting in disturbance to soils and vegetation. Land rest and rehabilitation are required in mechanized training areas as detailed in Section 2.5.1.2, Evaluation and Rotation of Training Areas, and Section 3.2.1.4, Maneuver Damage Control Program, so these areas are not available at all times to support training activities. Use of mechanized training areas can also be limited in the area of small-arms live-fire ranges if the ranges are actively being used for training activities.

Dismounted-only training areas have no vehicular traffic, except for emergency vehicles and on designated trails. These areas of PCMS primarily include canyons that are unsuitable for mechanized training. Soldiers can move in these areas on foot only. Activities occurring in dismounted training areas include surveying, setting up communication equipment, bivouacking, and rappelling. Use of artificially-generated smoke during training exercises may occur. In addition, engineering activities (e.g., digging fighting positions or tank ditches, obstacle removal, construction of forward operating bases) may also occur in dismounted-only training areas if coordinated through DPTMS (see Section 3.2.1.4).

Training at PCMS also includes lasers and the Multiple Integrated Laser Engagement System (MILES). This system uses laser tracking systems to register the destruction of friendly and enemy vehicles and provides a realistic battlefield environment for Soldiers involved in training exercises. MILES provides tactical engagement simulation for direct fire, force-on-force training using eye-safe laser “bullets” (not the Class 3B and 4 lasers being considered under the Proposed Action). Laser transmitters are attached to each individual and vehicle weapon system and accurately replicate actual ranges and lethality of specific weapon systems (e.g., tanks, vehicles, rifles, etc.). Use of lasers on-post is regulated under FC 385-63, *Range Safety*.

Small-arms live-fire ranges include SDZs identified to protect personnel during weapons training. The SDZs are available for maneuver training when no live-fire activities are occurring. The acreage of the SDZs, therefore, is not additive to the maneuver training areas. Live-fire authorized in these areas include 40-mm training and practice rounds. Aviation firing of 20-mm and 30-mm rounds is allowable on Range 9.

PCMS lands are primarily managed for the sustainment of the military mission (see Section 2.5). To accomplish this purpose, land management is focused on natural resources, land rehabilitation, and wildfires, including prescribed burning (see Section 3.7, Biological Resources, and for fire-fighting capabilities on- and off-post, Section 3.9, Socioeconomics). Restricted areas protect lands that support wildlife, ecosystems, soils, facilities, and cultural resources. There are varying training use limitations in restricted areas. For example, in areas with known occurrences of buried cultural resources, digging is not permitted.

### 3.2.1.3 Land Use Planning

Land use planning at PCMS is the responsibility of Fort Carson’s DPW Master Planning Division. Master planning at PCMS is also tied to Fort Carson because facility and training requirements at PCMS are dependent on the troops stationed at Fort Carson. The Master Planning Division continuously assesses the need for new facilities and how new facilities can be incorporated to best complement existing land uses at PCMS through its master planning process. The 2009 Real Property Master Plan Digest Update guides long-term development at PCMS. See Section 2.5, PCMS Training Protocol and Range Management, for a discussion of training land management.

#### 3.2.1.4 Maneuver Damage Control Program

FC Reg 350-10, *Maneuver Damage Control Program*, provides Commanders guidance to evaluate the value of the intended training against the cost and possible environmental effects of maneuver damage. The regulation assists Commanders in this evaluation by providing information on the control of maneuver damage. The goal of the program is to comply with local, state, and Federal laws and regulations, and to maximize training opportunities while minimizing damage to the training lands.

Military assembly areas, excavation training, and the movement of vehicles are the major sources of maneuver damage. As part of the MDCP, the following use areas were established within training areas in order to protect resources and for rehabilitation following maneuver training:

- Limited-Use Areas - Training areas are designated as limited-use areas following training events that would require rest and rehabilitation for the sustainment of training lands. Units may drive through limited-use areas on existing routes or trails, and may conduct dismounted training off the routes. Units cannot dig, bivouac, or maneuver vehicles off the routes or trails in limited-use areas. The areas are surrounded by limited-use signs. These areas are the most impacted sites in the training areas, and are being rehabilitated for continued, sustainable training use or for other administrative reasons such as test, experimentation, and evaluation. Most limited-use areas are in limited-use status for three years, but are pulled out of this status (and placed back in dismount-only or mechanized status) as soon as possible after the site has recovered and the vegetation can once again withstand military training.
- Off-Limits Areas (Restricted Areas) - Training in off-limits areas is prohibited. These areas are designated on overlays and are marked with off-limits signs. Some of these areas contain serious safety hazards and others are protected by Federal law (e.g., select cultural resources).
- Dismounted-Only Training Areas - Training in dismounted-only training areas must be limited to dismounted training activities only and all ground-disturbing activities must be requested through DPTMS, Range Division for coordination and permission in advance of the training exercise. Vehicle traffic is restricted to existing routes and trails. Major dismounted-only training areas are designated with Letters A through H. Training areas with lettered designation are permanently restricted to dismount-only training; mechanized-training areas (i.e., numbered training areas) can be temporarily downgraded to dismounted-only training following a maneuver exercise. Dismounted-only training areas are identified by the placement of "Seibert Stakes" and "Seibert Signs" that are commonly used at military installations to designate areas that should be avoided. On PCMS, Seibert Stakes/Signs mean "NO DIGGING and NO VEHICLE TRAFFIC."

#### 3.2.1.5 Recreation

The Sikes Act, 16 USC 670a, as amended in November 1997, requires public access to military installations to the extent that such use is subject to the military mission and the protection of fish and wildlife resources. Public access is subject to requirements deemed necessary to ensure safety and military security.

In accordance with the MOU between the DoD, USFWS, and International Association of Fish and Wildlife Agencies, public access to outdoor recreation on PCMS is provided when training activities are not being held, subject to mission, safety, and security requirements. Fort Carson issues an annual "Recreation Pass," for recreational activity to include hunting and camping

(hunters only). Recreational users are allowed in the training areas and are required to camp in a field at the Hill Ranch area near Highway 350. For safety reasons, all recreational users must check in and out each day.

PCMS offers the single largest contiguous parcel of Federally-owned lands available for hunting in the region. The abundance of game, the timing of hunting seasons (close to the rut), and the hunt success rate make PCMS a highly desirable hunting area. Licenses are granted to hunt on PCMS annually. Licenses to hunt are limited; for example, only 20 licenses were granted to hunt buck deer with a rifle on PCMS for 184 applicants in 2013 (CDOW, 2013a).

PCMS contains numerous resources that offer potential heritage tourism opportunities (see Section 3.8, Cultural Resources). Army personnel host field trips on PCMS, as military security and cultural resources staffing allow, for school groups, conservation organizations, or other civic groups with interest in the prehistory or history of the region. In addition, some tours are offered for wildlife habitat improvements. No other tourism-related use of these sites occurs.

### 3.2.1.6 Regional Land Use

PCMS is surrounded on three sides by land that is zoned for agricultural uses and used for dryland cattle grazing. The Comanche National Grassland, which is managed by the USFS, lies immediately north of PCMS and consists of undeveloped open land and several recreation sites (e.g., biking, hiking). Areas bordering PCMS contain ranches, farms, and a few residences. Several small communities are located near PCMS along U.S. 350, including Model, Timpas, Thatcher, Houghton, and Delhi. Trinidad, which has a population of approximately 10,000, is located 40 miles southwest of PCMS. La Junta, with a population of approximately 7,000, is located approximately 42 miles to the northeast.

Since the Army acquired PCMS in the early 1980s, development has not occurred to any substantial degree along any boundaries. Many tracts of private land along the northern border of PCMS have changed ownership from large ranches controlled by only a few owners, to numerous smaller parcels (approximately 40 acres each) that are individually owned.

Regional land use includes components supporting tourism and recreation. The region contains numerous cultural resources and historic attractions, which provide regional heritage tourism opportunities (e.g., the Santa Fe Trail) (see Section 3.8, Cultural Resources). Off-post recreation in the region includes hunting, fishing, and birding opportunities on state and Federal lands such as the Comanche National Grasslands.

Comprehensive planning and land use in Las Animas County is governed by the Las Animas County Land Use Regulations (Las Animas County, 2013). The *Land and Resource Management Plan for the Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands* (USFS, 1984) governs land use in the Comanche National Grasslands. USFS's plan describes existing conditions, identifies desired conditions, and articulates management goals.

Prior to acquisition by DoD, the area now designated as PCMS had supported large grazing operations on private landholdings and low human densities since it was first settled in the late 1870s. Military training began in August 1985.

Historical concerns with training from off-post residents include, but are not limited to: impacts to private residences and livestock from sound and vibrations migrating off-post, and wildfires caused by training or from prescribed burns resulting in wildlife migration into grazing and agricultural lands (see Section 3.7, Biological Resources). In addition, concerns include the occurrence of noise precluding development in the surrounding region, as well as restrictions of training lands, which limits heritage tourism opportunities on and around PCMS. The possibility



of PCMS expansion was a concern that also potentially precluded local development; however, in 2013 DoD approved the Army's request to withdraw its 2007 acquisition waiver, formally ending the Army's land acquisition efforts at PCMS (see Section 2.4, Preferred Alternative). There have also been anecdotal isolated occurrences of overflights, some at low-level, near the installation border outside of designated flight paths that have resulted in disruptions to off-post residences.

### 3.2.1.7 Aesthetics

PCMS has a varied landscape, consisting of flat to gently sloping plains areas, limestone ridges in the northwestern portion of the range, valley lands near the Purgatoire River, and a series of steep rock-strewn cliffs and rolling mesa tops of flat, rolling hills near the Purgatoire River canyon and associated side canyons. The majority of the installation is undeveloped; facilities are limited on the installation and are concentrated in the cantonment area (see Figure 3.2-1). The surrounding landscape is similar to that of PCMS. It is predominately rural in character and characterized by limited development.

Ongoing training at PCMS can result in noise, vibrations, or fugitive dust emissions migrating off-post, which can affect local and regional aesthetics (see Section 3.3, Air Quality and Greenhouse Gases, and Section 3.4, Noise).

## 3.2.2 Environmental Consequences

This section provides a discussion of the possible environmental impacts to land use that could result from the alternatives described in Chapter 2, Description of the Proposed Action and Alternatives. Impacts to land use would be considered significant if the Army actions are: substantially incompatible with existing military land uses and land use designations or have major conflicts with Army land use plans, policies, or regulations; or create a substantial land use conflict with off-post land use. Table 3.2-2 provides a comparison summary of anticipated level of impacts.

**Table 3.2-2. Summary of Land Use Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            | X     |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         |            |       | X        |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Combined Elements <sup>a</sup>        |            |       | X        |             |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         |            |       | X        |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Aviation Gunnery and Flare Training   |            | X     |          |             |            |

**Table 3.2-2. Summary of Land Use Impacts**

| Alternative                    | Negligible | Minor | Moderate | Significant | Beneficial |
|--------------------------------|------------|-------|----------|-------------|------------|
| Electronic Jamming Systems     | X          |       |          |             |            |
| Laser Targeting                | X          |       |          |             |            |
| Demolitions Training           |            | X     |          |             |            |
| UAS Training                   | X          |       |          |             |            |
| UGV Training                   | X          |       |          |             |            |
| Airspace Reclassification      |            | X     |          |             |            |
| DZ Development                 | X          |       |          |             |            |
| Combined Elements <sup>a</sup> |            |       | X        |             |            |

a. Note: Overall combined level of direct impact to land use would be moderate for Army training lands due to the potential for year-to-year decreases in mechanized maneuver training areas from BCT training as areas are rotated out of mechanized training during repair. While this could result in moderate impacts year-to-year, this would provide an overall long-term benefit to land use at PCMS as it would provide for long-term sustainment of training lands. Other actions would be confined within PCMS and would not affect adjacent land use (also refer to Section 3.3, Air Quality and Greenhouse Gases, and Section 3.4, Noise).

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.2.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Under the No Action Alternative, training activities would continue under current levels as described in Section 2.2.1. As shown in Section 2.5.3, the most recent ABCT training exercise resulted in damage and temporary “limited use” designation of 1,200 acres of maneuver land while these areas are rotated out of mechanized maneuver training for recovery. Military lands would continue to experience these types of disturbances and require restoration to maintain the long-term availability of lands for military use. Overall adverse impacts to military training lands would be minor as existing land and environmental management programs would continue under the No Action Alternative as described in Section 2.2.1. The ITAM program would also continue to monitor training activities, institute projects to minimize training damage, and educate Soldiers to limit damage on training lands. Decisions regarding training activities would continue to consider both training needs and necessary sustainment measures, to maintain land suitable for training while also maximizing the achievement of the training mission.

Recreational uses would still be allowed in the training areas when they would not interfere with military missions. Under the No Action Alternative, training areas would continue to be restricted for recreational use during military training. Limitations on hunting would continue to affect recreational use by limiting use of the single largest contiguous and diverse areas of public hunting grounds in southeast Colorado. The U.S. Army recognizes that PCMS is a valued hunting area in the state and works with the CPW to meet game management goals and provide recreational hunting opportunities on PCMS that do not conflict with military training operations.

Noise traveling in areas outside PCMS boundaries (see Section 3.4, Noise) may continue to discourage residential development or development of other sensitive receptors in these areas in the future. Noise from ongoing training activities and aviation may also continue to generally disturb sensitive residences as well as potentially impact livestock and ranching activities surrounding the installation.

Ongoing restrictions on access to PCMS lands and cultural sites to the public during training events would continue to limit heritage tourism opportunities within PCMS lands.

No other impacts to existing or future land uses surrounding PCMS would occur as a result of the No Action Alternative. PCMS would remain a military training facility, which is the current land use designated by Las Animas County and recognized by surrounding property owners.

### **3.2.2.2 Proposed Action Alternative 1A –Brigade Maneuver Training and Maneuver Impacts Measurement**

#### **3.2.2.2.1 ABCT, IBCT, and SCBT Training**

BCT training activities at PCMS would continue to degrade training lands. Affects to the long-term availability of training lands for military use would result in moderate adverse land use impacts to combined BCT training activities within PCMS. Less intensive IBCT training would not likely cause more than minor adverse effects as these activities are focused within dismounted-only training areas and use of vehicles is restricted to existing PCMS roadways within the dismounted-only training areas. ABCT training, which uses larger training footprints and is more land-intensive due to its mechanized (heavy tracked and wheeled) vehicles, would affect the year-to-year availability of mechanized maneuver training lands available to Fort Carson units. As discussed in Section 3.2.1.4 (Maneuver Damage Control Program), areas of intensive use are rotated out of mechanized training for periods of up to three years. Also, ABCT training events utilize a large footprint within the mechanized training area. Areas within these large footprints could be rotated out of mechanized training area use, reducing the land available for mechanized BCT training within a given year, causing moderate adverse impacts to training land availability within PCMS. SBCT training events would utilize a comparatively smaller footprint, as they would primarily stay on roads and trails until they reach their objective and then conduct dismounted training similar to IBCTs. SBCT training would also utilize primarily Stryker (wheeled) vehicles which would have a lower impact on soils and general land sustainability when compared to tracked vehicles utilized in ABCTs. While BCT training could result in year-to-year decreases in training land available, this would provide an overall long-term benefit to land use at PCMS as it would provide for long-term sustainment of training lands. Continued implementation of the MDCP and utilizing existing PCMS trail networks during training events would reduce the overall level of adverse effects.

Noise-disturbing activities would continue to occur from traffic during convoys and maneuvers training; impacts to sensitive receptors off-post would be similar to existing conditions (see Section 3.4, Noise). Noise impacts in areas outside PCMS boundaries would continue to discourage residential development or development of other sensitive receptors in these areas in the future. In addition, noise impacts would continue to affect existing ongoing activities near the installation border, including ranching activities during calving and branding seasons of cattle and other livestock, as unexpected and loud noises can be stressful to livestock (Gradin, 1989). Noise effects from training would continue to cause additional periods of wildlife avoidance within PCMS lands, which could temporarily drive wildlife from PCMS onto surrounding lands. See Section 3.4, Noise, for further discussion on noise impacts. See Section 3.7, Biological Resources, for further discussion on impacts to wildlife from noise. Overall

indirect impacts to land use from noise effects as a result of ABCT, IBCT, and SBCT training would be minor.

Training areas would continue to be made available for hunting; however, increased training time and space required for expanded ABCT training events could reduce periods of recreational opportunities, resulting in minor adverse impacts. Fort Carson would continue its program to provide field trips for parties interested in the prehistory and history of the region, as permitted based on training activities and availability of personnel to conduct tours.

BCT training events would also continue the possibility for wildland fires. Wildland fires could temporarily drive wildlife off PCMS into adjacent lands used for agriculture and cattle grazing. Wildland fire prevention and management, however, would continue to be implemented and only minor adverse impacts would be anticipated (see Section 3.7, Biological Resources, for a discussion of wildland fire management).

BCT training activities would also continue to result in slight visibility changes and increases in fugitive dust, which could result in disruptions to off-post residences and land use. These impacts would be sporadic and negligible.

As described in Section 2.2.2.1, the Army would establish a BCT-level training intensity limit using SMAs and total Task Miles to complement the 4.7-month brigade-level training period duration. Adoption of this methodology would have no direct adverse impacts on land use. This approach, however, would allow the Army to manage brigade-level training periods using intensity and duration metrics rather than just duration and provide the Army with an additional measure regarding intensity of BCT training to manage training lands. The Army would cease brigade-level training when either the duration or intensity metric, whichever comes first, is attained during a training year. The use of an additional metric to gauge training land sustainability would be an overall benefit to land use.

### **3.2.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

#### **3.2.2.3.1 ABCT, IBCT, and SBCT Training**

Section 3.2.2.2 discusses potential impacts regarding proposed BCT training activities and SMA and Total Task Miles. As analyzed within Proposed Action Alternative 1A, brigade maneuver training and reconfiguration would result in individually minor to moderate impacts to land use. Potential impacts from readiness training using new tactics and equipment are discussed below.

#### **3.2.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

Aviation gunnery actions would require the establishment of two new SDZs, which would represent a change in land use designation on PCMS; however, these areas are currently utilized for military training and would not result in adverse impacts to land use.

Aviation gunnery would include air-to-ground firing, as well as an increase in munitions caliber to be fired at PCMS. An increase in munitions caliber could result in increased degradation of training lands and affect the long-term availability of training lands for military use; however, implementation of land management and environmental programs would continue to balance training requirements and the need to maintain quality training lands for sustained military use, and would reduce impacts to minor (see Section 2.5, PCMS Training Protocol and Range Management). Recreational use would not be limited any further by aviation gunnery than under current management or as by other training activities under the Proposed Action.



Use of flares would result in short-term, localized instances of illumination in the sky, which would be more noticeable during nighttime hours. Illumination would be comparable to a cluster of bright shooting stars depending on the amount of flares used during a training event. Illumination would occur until the charge has burned off and would result in short-term light bursts of less than one minute. Flare use would be allowed only within PCMS airspace above unrestricted training areas, but could be visible to off-post residences adjacent to the PCMS boundary. Visibility of flares could be viewed as a disturbance to sensitive receptors off-post; however, overall impacts to land use from illumination would be short-term and minor. Nominal amounts of flare debris would be expected to accumulate in training areas; however, most residue would dissipate or evaporate before it would accumulate in adjacent soils and is not anticipated to affect recreational use or other land uses at PCMS (see Section 3.13, Hazardous Materials, Hazardous Waste, and Toxic Substances).

Aviation gunnery and flare training would constitute an incremental increase in noise from aircraft but would be short-term, discrete events that occur well above ground level. Indirect impacts from noise would be minor and similar to those discussed under BCT Training.

#### **3.2.2.3.3 Electronic Jamming Systems**

Training using EW technologies that are intended to jam enemy cell phones, FM radios, ground-based sensors, IED, and other enemy-related communications would utilize Army-specific frequencies (i.e., frequencies distinct from those made available for public use) and would not affect civilian or commercial frequencies outside of PCMS boundaries. No impacts to land use would be anticipated.

#### **3.2.2.3.4 Laser Target**

Laser systems that would be utilized under Alternative 2 would require the establishment of temporary LSDZs. LSDZs would be generated during the mission planning phase and would be dependent on RA classification. LSDZs would be confined to areas within PCMS and training would not adversely impact surrounding land use adjacent to PCMS.

#### **3.2.2.3.5 Demolitions Training**

Demolitions training would be conducted within eight proposed designated breach sites and would be compatible with training land use. Noise increases would be less than significant and would result in minor land use conflicts with off-post residences and livestock operations (see Section 3.4, Noise). Long-term increases of sporadic, loud noise events could result in minor land use impacts to adjacent off-post land users.

In addition, demolitions training could result in impacts to cultural resources, which could impact the long-term viability of sites. Protection of cultural resources and mitigation measures, when avoidance is not possible, are discussed in Section 3.8, Cultural Resources.

#### **3.2.2.3.6 UAS Training**

Increases in training frequency of UAS would be consistent with existing land use designations at PCMS and, therefore, would not impact on-post or off-post land use.

#### **3.2.2.3.7 UGV Training**

UGV training would be consistent with existing land use designations at PCMS and, therefore, would not impact on-post or off-post land use.

**3.2.2.3.8 Airspace Reclassification**

Airspace reclassification would limit and restrict commercial and private aviation near PCMS when RA is activated and would result in indirect impacts to commercial and private aviators (see Section 3.11, Airspace). Airspace reclassification would not impact land use on-post or off-post.

**3.2.2.3.9 DZ Development**

Establishment of DZs on PCMS would occur in areas currently used for military training and, therefore, would not impact on-post or off-post land use.

**3.2.3 Mitigation Measures**

Mitigation through enhanced application of existing land management programs, including training land rotations, and LRAM land rehabilitation efforts, would be necessary to offset training impacts and maintain quality training lands for sustained military use.

### 3.3 Air Quality and Greenhouse Gases

#### 3.3.1 Affected Environment

##### 3.3.1.1 National Ambient Air Quality Standards and Attainment Status

The USEPA Region 8 and CDPHE regulate air quality in Colorado. The CAA (42 USC. 7401-7671q), as amended, assigns the USEPA responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than 10 microns in diameter [ $PM_{10}$ ] and particulate matter less than 2.5 microns in diameter [ $PM_{2.5}$ ]), sulfur dioxide ( $SO_2$ ), carbon monoxide (CO), oxides of nitrogen ( $NO_x$ ), ozone ( $O_3$ ), and lead. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. While each state has the authority to adopt standards stricter than those established under the Federal program, Colorado accepts the Federal standards.

Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as *nonattainment* areas. Federal regulations designate AQCRs with levels below the NAAQS as *attainment* areas. Las Animas County (and therefore all areas associated with the No Action Alternative and the Proposed Action Alternatives 1A and 1B) are within the San Isabel Intrastate AQCR (40 CFR 81.175). The USEPA has designated Las Animas County as in attainment for all criteria pollutants (USEPA, 2014a). The USEPA monitors levels of criteria pollutants at representative sites in each region throughout Colorado. For reference purposes, Table 3.3-1 shows the monitored concentrations of criteria pollutants at the monitoring station closest to PCMS in Colorado Springs (USEPA, 2014b).

**Table 3.3-1. Air Quality Standards and Monitored Data**

| Pollutant                          | Air Quality Standards | Monitored Data |
|------------------------------------|-----------------------|----------------|
| <b>CO</b>                          |                       |                |
| 1-hour Maximum <sup>a</sup> (ppm)  | 35                    | <no data>      |
| 8-hour Maximum <sup>a</sup> (ppm)  | 9                     | <no data>      |
| <b>NO<sub>2</sub></b>              |                       |                |
| 1-hour (ppb)                       | 100                   | <no data>      |
| <b>O<sub>3</sub></b>               |                       |                |
| 8-hour Maximum <sup>b</sup> (ppm)  | 0.075                 | <no data>      |
| <b>SO<sub>2</sub></b>              |                       |                |
| 1-hour Maximum <sup>a</sup> (ppb)  | 75                    | <no data>      |
| 24-hour Maximum <sup>a</sup> (ppb) | 140                   | <no data>      |

**Table 3.3-1. Air Quality Standards and Monitored Data**

| Pollutant                                                | Air Quality Standards | Monitored Data |
|----------------------------------------------------------|-----------------------|----------------|
| <b>PM<sub>2.5</sub></b>                                  |                       |                |
| 24-hour Maximum <sup>c</sup> (µg/m <sup>3</sup> )        | 35                    | 17             |
| Annual Arithmetic Mean <sup>d</sup> (µg/m <sup>3</sup> ) | 12                    | 6.5            |
| <b>PM<sub>10</sub></b>                                   |                       |                |
| 24-hour Maximum <sup>a</sup> (µg/m <sup>3</sup> )        | 150                   | 62             |

Sources: 40 CFR 50.1-50.12, USEPA, 2014b.

a. Not to be exceeded more than once per year.

b. The 3-year average of the fourth highest daily maximum 8-hour average O<sub>3</sub> concentrations over each year must not exceed 0.08 ppm.

c. The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor must not exceed 35 micrograms per cubic meter air (ug/m<sup>3</sup>).

d. The 3-year average of the weighted annual mean PM<sub>2.5</sub> concentrations must not exceed 12.0 ug/m<sup>3</sup>.

CO=carbon monoxide; O<sub>3</sub>=ozone; PM<sub>2.5</sub>=particulate matter less than 2.5 microns in diameter; PM<sub>10</sub>=particulate matter less than 10 microns in diameter; ppb=parts per billion; ppm=parts per million; NO<sub>2</sub>=nitrogen dioxide; SO<sub>2</sub>=sulfur dioxide; µg/m<sup>3</sup>=micrograms per cubic meter

### 3.3.1.2 Installation-Wide Emissions

Air emission sources at PCMS consist largely of fugitive dust, although they also include military training involving smoke and obscurants, and a few small stationary combustion sources in the cantonment area and at austere camps throughout the area. PCMS maintains an operating permit for its minor stationary sources of air emissions. Fugitive emissions from training activities such as smoke and obscurants are managed according to FC Reg 350-4, which stipulates that smoke and obscurants would not be used within 1 kilometer (smoke pots and generators) and 300 meters (hand-held) of the installation boundary. Table 3.3-2 includes the existing maximum annual emissions from the use of stationary sources, convoys, maneuvers, wind erosion, smoke and obscurant use, and vehicle exhaust to support the following activities:

- Three ABCT training events at PCMS per year, with each ABCT containing approximately 824 wheeled vehicles and 329 tracked vehicles
- Two IBCT training events at PCMS per year, with each IBCT containing approximately 851 wheeled vehicles
- Fifteen battalion-level training events at PCMS per year, with each containing between 86 and 159 wheeled vehicles

**Table 3.3-2. Maximum Annual Emissions at PCMS for All Activities**

| Source                                 | Maximum Annual Emissions (tpy) |                   |      |                 |     |                 |
|----------------------------------------|--------------------------------|-------------------|------|-----------------|-----|-----------------|
|                                        | PM <sub>10</sub>               | PM <sub>2.5</sub> | VOC  | NO <sub>x</sub> | CO  | SO <sub>2</sub> |
| No. 2 Oil Boilers, Furnaces, & Heaters | 0.2                            | 0.2               | 0.1  | 4.5             | 1.1 | 1.6             |
| Propane Furnaces & Heaters             | 0.0                            | 0.0               | 0.0  | 1.0             | 0.1 | 1.0             |
| Storage Tanks                          | ---                            | ---               | 3.4  | ---             | --- | ---             |
| Smoke and Obscurants                   | 55.7                           | 55.7              | 54.3 | ---             | --- | ---             |

**Table 3.3-2. Maximum Annual Emissions at PCMS for All Activities**

| Source             | Maximum Annual Emissions (tpy) |                   |              |                 |              |                 |
|--------------------|--------------------------------|-------------------|--------------|-----------------|--------------|-----------------|
|                    | PM <sub>10</sub>               | PM <sub>2.5</sub> | VOC          | NO <sub>x</sub> | CO           | SO <sub>2</sub> |
| Training Exercises | 5,560.2                        | 853.3             | 54.7         | 1,732.4         | 385.7        | 134.9           |
| <b>Total</b>       | <b>5,616.1</b>                 | <b>909.2</b>      | <b>112.6</b> | <b>1,737.9</b>  | <b>387.0</b> | <b>137.5</b>    |

Source: Fort Carson, 2008.

CO=carbon monoxide; PM<sub>2.5</sub>=particulate matter less than 2.5 microns in diameter; PM<sub>10</sub>=particulate matter less than 10 microns in diameter; NO<sub>x</sub>=nitrogen oxides; SO<sub>2</sub>=sulfur dioxide; tpy=tons per year; VOC=volatile organic compound

- 1 Table 3.3-3 outlines the maximum daily emissions from training at PCMS, which includes
- 2 convoys, maneuvers, wind erosion, smoke and obscurant use, and vehicle exhaust to support
- 3 an ABCT training rotation. Notably, SBCT, IBCT and battalion-level training events have the
- 4 same or lower maximum daily emissions than ABCT exercises. The peak daily emissions during
- 5 an ABCT training event (see Table 3.3-3) are only a fraction of the maximum annual emissions
- 6 outlined above (Table 3.3-2).

**Table 3.3-3. Maximum Daily Emissions from ABCT Maneuvers - Existing Conditions**

| Emission Source            | Maximum Daily Emissions (tpd) |                   |             |                 |            |                 |
|----------------------------|-------------------------------|-------------------|-------------|-----------------|------------|-----------------|
|                            | PM <sub>10</sub>              | PM <sub>2.5</sub> | VOC         | NO <sub>x</sub> | CO         | SO <sub>2</sub> |
| Maneuvers                  | 83.0                          | 12.5              | -----       | -----           | -----      | -----           |
| Maneuver Area Wind Erosion | 2.8                           | 0.4               | -----       | -----           | -----      | -----           |
| Initial Wind Erosion       | 29.2                          | 4.4               | -----       | -----           | -----      | -----           |
| Vehicle Exhaust            | 1.4                           | 1.4               | 1.5         | 24.5            | 5.5        | 1.9             |
| Smoke and Obscurants       | 55.7                          | 55.7              | 54.3        | -----           | -----      | -----           |
| <b>Total</b>               | <b>172.1</b>                  | <b>74.4</b>       | <b>55.8</b> | <b>24.5</b>     | <b>5.5</b> | <b>1.9</b>      |

Source: Fort Carson, 2008.

CO=carbon monoxide; PM<sub>2.5</sub>=particulate matter less than 2.5 microns in diameter; PM<sub>10</sub>=particulate matter less than 10 microns in diameter; NO<sub>x</sub>=nitrogen oxides; SO<sub>2</sub>=sulfur dioxide; tpd=tons per day; VOC=volatile organic compound

### 7 3.3.1.3 Class I Areas

- 8 Federal regulations provide rigorous safeguards to prevent deterioration of the air quality in
- 9 Class I areas which exceed 5,000 acres as specified in 40 CFR 51.166(e) (USEPA, 2014c).
- 10 USEPA Class I areas include all international parks, all national wilderness areas, and national
- 11 memorial parks that exceed 5,000 acres, and all national parks that exceed 6,000 acres in
- 12 existence on August 7, 1977. In response to the 2009 EIS for Implementation of Fort Carson
- 13 Grow the Army Stationing Decisions, a detailed analysis of the effects maneuvers training at
- 14 PCMS on Class I areas was conducted. As outlined in the analysis, Class I areas located within
- 15 322 kilometers (200 miles) of PCMS include the Wheeler Peak Wilderness Area, La Garita
- 16 Wilderness Area, Weminuche Wilderness Area, Great Sand Dunes National Park and Preserve,
- 17 and Pecos Wilderness Area (Figure 3.3-1). Additionally, several nearby Colorado locations that
- 18 have scenic and/or important views have been designated by Federal Land Managers as
- 19 sensitive Class II areas (USEPA, 2014d; NPS, 2010).

#### 20 3.3.1.3.1 Far-Field Assessment

- 21 The USEPA-recommended CALPUFF model and the maximum annual emissions (Table 3.3-2)
- 22 were used to predict the far-field concentrations of criteria pollutants near PCMS. The analysis

compared modeled concentrations of criteria pollutants to significant impact levels (SILs) to assess existing effects on Class I areas. SILs are normally used to determine if a source of emissions may cause or contribute to a violation of the NAAQS. Results showed a 24-hour  $PM_{10}$  concentration above the SIL and a barely perceptible visibility change at the Great Sand Dunes National Park and Preserve for 1 day out of the 3 years modeled. No other visibility changes were observed for any Class I area, and all other modeled concentrations (short- and long-term) were below their SILs. For Great Sand Dunes, the monitored background 24-hour  $PM_{10}$  concentration of 79 one-millionth of a gram per cubic meter air ( $ug/m^3$ ) was added to the maximum predicted concentration, and the resulting concentration of 79.5  $ug/m^3$  was well below the NAAQS of 150  $ug/m^3$ . Notably, only 0.6 percent (0.5  $ug/m^3$ ) of the modeled concentration of 79.5  $ug/m^3$  could be attributed to PCMS on a single day. This is assuming the "worst case" emissions during 3 ABCT, 2 IBCT, and 15 battalion-level training events per year for three years (Fort Carson, 2008). These existing effects are indistinguishable from background levels during periods without training at PCMS.

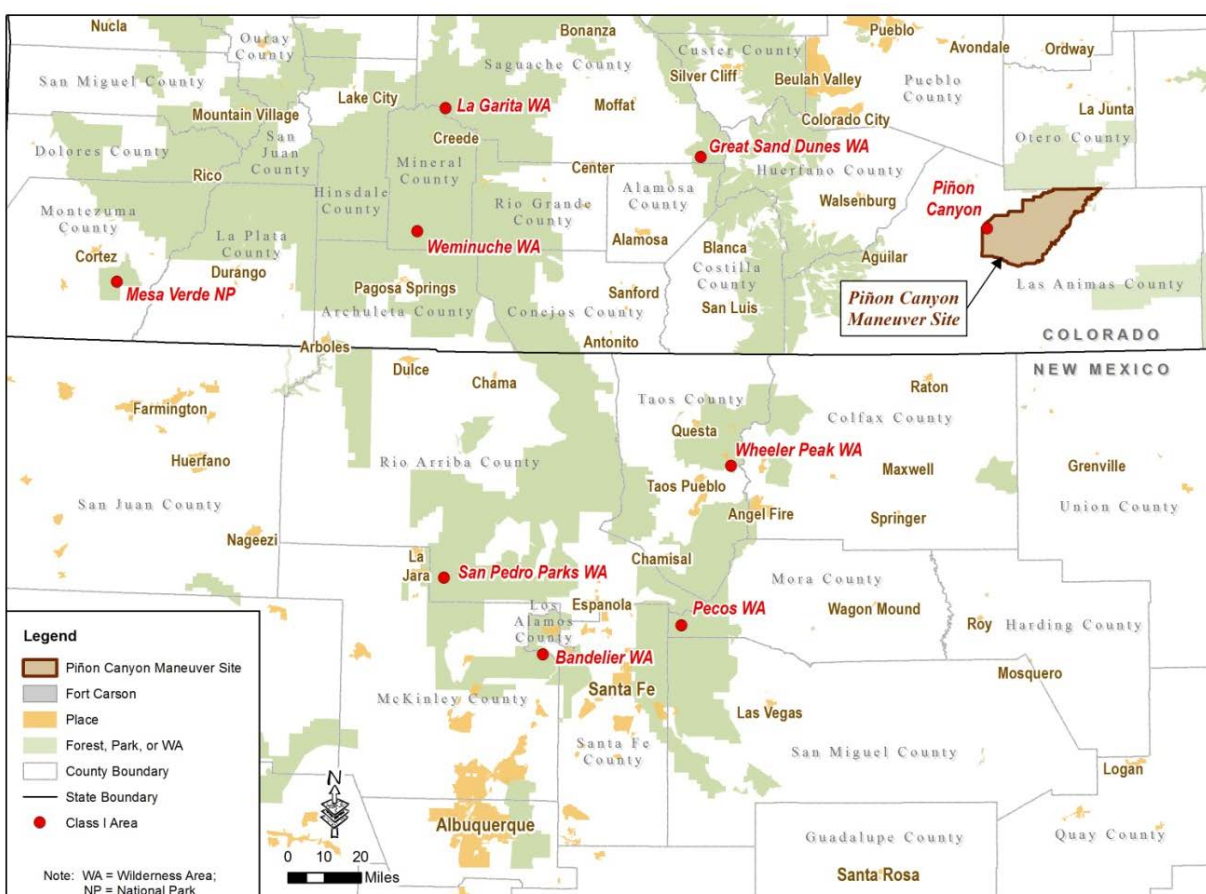


Figure 3.3-1. Class I Areas within 200 miles of PCMS

### 3.3.1.3.2 Near-Field Assessment

The DUSTAN atmospheric modeling system and the existing maximum daily ABCT maneuvers emissions (Table 3.3-3) were used to predict the near-field 24-hour average  $PM_{10}$  and  $PM_{2.5}$  concentrations near PCMS during existing training exercises. The highest predicted particulate concentration [ $ug/m^3$ ] modeled was for the 24-hour period following a day of maneuver exercises. Modeled concentrations (including background) did not exceed the

NAAQS and Colorado Ambient Air Quality Standards (CAAQS) for any training scenario. Minute incremental increases in particulate concentrations are expected as far away as 25 miles from PCMS; however, these existing effects are indistinguishable from background levels during periods without training at PCMS (Fort Carson, 2008).

### 3.3.1.4 Climate and Greenhouse Gases

Las Animas County's average high temperature is 93.8°F (34.3 degrees Celsius (°C)) in the hottest month of July, and its average low temperature is 15.3°F (-9.3°C) in the coldest month of January. Las Animas County has average annual precipitation of 11.7 inches (29.7 centimeters) per year. The wettest month of the year is July with an average rainfall of 2 inches (5.1 centimeters) (Idcide, 2014).

Greenhouse gases (GHGs) are components of the atmosphere that trap heat relatively near the surface of the earth, and therefore, contribute to the greenhouse effect and climate change. Most GHGs occur naturally in the atmosphere, but increases in their concentration result from human activities such as the burning of fossil fuels. Global temperatures are expected to rise as human activities continue to add carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, and other greenhouse (or heat-trapping) gases to the atmosphere. Whether rainfall will increase or decrease remains difficult to project for specific regions (USEPA, 2014e; IPCC, 2007).

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, outlines policies intended to ensure that Federal agencies evaluate climate-change risks and vulnerabilities, and to manage the short- and long-term effects of climate change on their operations and mission. The EO specifically requires agencies within the DoD to measure, report, and reduce their GHG emissions from both direct and indirect activities. The DoD has committed to reduce GHG emissions from non-combat activities by 34 percent by 2020 (DoD, 2010). In addition, the CEQ released draft guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA analyses. The draft guidance includes a presumptive effects threshold of 27,563 tons per year (25,000 metric tons per year) of CO<sub>2</sub> equivalent emissions from a Federal action (CEQ, 2010).

### 3.3.2 Environmental Consequences

This section provides a discussion of the possible environmental impacts to air quality and impacts to GHGs that could result from the No Action and Proposed Action alternatives. Impacts to air quality and GHGs would be considered significant if they threaten the attainment status of the region or generate substantial GHG emissions (>25,000 metric tons CO<sub>2</sub> equivalents per year). Table 3.3-4 provides a comparison summary of anticipated level of impacts.

**Table 3.3-4. Summary of Air Quality and GHG Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            | X     |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |

**Table 3.3-4. Summary of Air Quality and GHG Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Aviation Gunnery and Flare Training   | X          |       |          |             |            |
| Electronic Jamming Systems            | X          |       |          |             |            |
| Laser Targeting                       | X          |       |          |             |            |
| Demolitions Training                  | X          |       |          |             |            |
| UAS Training                          | X          |       |          |             |            |
| UGV Training                          | X          |       |          |             |            |
| Airspace Reclassification             | X          |       |          |             |            |
| DZ Development                        | X          |       |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |

a. Overall combined level of direct impact to air quality and GHGs would remain minor.  
ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.3.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Selecting the No Action Alternative would result in no changes in air quality. This alternative involves continuing existing training missions and environmental programs at PCMS, and maintaining existing environmental conditions through current operational controls. Range maintenance, upgrades, and training activities would occur in accordance with existing procedures. Because the number and type of activities would remain consistent with current levels under the No Action Alternative, Fort Carson would continue its current use of fossil fuels for mobile and temporary sources at PCMS, resulting in minor impacts due to similar levels of emissions of both criteria pollutants and GHGs. Ambient air quality would remain unchanged when compared to existing conditions.

### 3.3.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement

Long-term (e.g., operational) minor adverse effects would be expected from BCT training. There would be no appreciable short-term (e.g., construction) effects to air quality from the action. Long-term effects would be primarily from vehicle exhaust and fugitive dust from maneuvers due to ABCT, IBCT, and SBCT training at PCMS. The use of other weapon systems and training would also incrementally increase air emissions at PCMS. Effects would be minor as emissions would not threaten the attainment status of the region, have adverse effects to any nearby Class I areas, exceed the GHG threshold in the draft CEQ guidance, or contribute to a



violation of any Federal, state, or local air regulation. Alternative 1A does not include the establishment of any new stationary sources of air emissions subject to CDPHE air permitting requirements. Should emergency generators or other temporary sources of emissions become required, they may require a minor permit to construct and operate from CDPHE.

The establishment of a BCT-level training intensity limit using SMAs and Total Task Miles to complement the 4.7-month brigade-level training period duration would have no adverse impacts on air quality.

**Greenhouse Gases and Climate Change.** When compared to existing conditions, all BCT training activities combined would generate some amount of GHG emissions. There would, however, be no new stationary sources of GHG emissions that would exceed the CEQ presumptive effects threshold. DoD is continuing to implement measures to reach its GHG reduction goals in accordance with EO 13514. Army-wide efforts to reduce GHG emissions include the Net Zero Initiative, Energy Initiatives Task Force, and the Army's overall reduction in force. These projected reductions, by design, would more than offset any project-related increase. These effects would be minor.

The establishment of a BCT-level training intensity limit using SMAs and Total Task Miles to complement the 4.7-month brigade-level training period duration would have no adverse impacts on GHG.

### 3.3.2.2.1 ABCT Training

Long-term minor effects would be expected. ABCT training would increase air emissions from traffic during convoys and from maneuvers training. ABCT-level training events would have the potential to involve 4,655 Soldiers, 84 M1 Abrams Tanks, and 117 Bradley Fighting Vehicles. The maximum daily emissions from ABCT training would increase by approximately one-third when compared to the existing conditions (Table 3.3-5). The total number of brigade-level training events would not change, and as with existing conditions, the frequency of these events would be sporadic. In addition, due to the conversion of an ABCT to a SBCT, the total number of future ABCT training events and associated air emissions would likely be replaced on a one-to-one basis with proposed SBCT exercises.

**Table 3.3-5. Maximum Daily Emissions from ABCT Maneuvers - Alternative 1A**

| Emission Source                            | Maximum Daily Emissions (tpd) |                   |             |                 |            |                 |
|--------------------------------------------|-------------------------------|-------------------|-------------|-----------------|------------|-----------------|
|                                            | PM <sub>10</sub>              | PM <sub>2.5</sub> | VOC         | NO <sub>x</sub> | CO         | SO <sub>2</sub> |
| Maneuvers                                  | 83.0                          | 12.5              | -----       | -----           | -----      | -----           |
| Maneuver Area Wind Erosion                 | 2.8                           | 0.4               | -----       | -----           | -----      | -----           |
| Initial Wind Erosion                       | 29.2                          | 4.4               | -----       | -----           | -----      | -----           |
| Vehicle Exhaust                            | 1.4                           | 1.4               | 1.5         | 24.5            | 5.5        | 1.9             |
| Smoke and Obscurants                       | 55.7                          | 55.7              | 54.3        | -----           | -----      | -----           |
| <b>Total</b>                               | <b>172.1</b>                  | <b>74.4</b>       | <b>55.8</b> | <b>24.5</b>     | <b>5.5</b> | <b>1.9</b>      |
| Estimated Increase from Alternative 1A     | 57.4                          | 24.8              | 18.6        | 8.2             | 1.8        | 0.6             |
| <b>Estimated Total with Alternative 1A</b> | <b>229.5</b>                  | <b>99.2</b>       | <b>74.4</b> | <b>32.7</b>     | <b>7.3</b> | <b>2.5</b>      |

Source: Fort Carson, 2008.

CO=carbon monoxide; PM<sub>2.5</sub>=particulate matter less than 2.5 microns in diameter; PM<sub>10</sub>=particulate matter less than 10 microns in diameter; NO<sub>x</sub>=nitrogen oxides; SO<sub>2</sub>=sulfur dioxide; tpd=tons per day; VOC=volatile organic compound

### 3.3.2.2.1.1 Far-Field Assessment

As outlined in Section 3.3.1.3.1, the CALPUFF model and the existing annual emissions were used to predict the far-field concentrations of criteria pollutants. The analysis compared modeled concentrations of criteria pollutants to SILs to assess effects of training on nearby Class I areas. The maximum annual emissions outlined in Table 3.3-2 includes all emissions from the use of stationary sources, convoys, maneuvers, wind erosion, smoke and obscurant use, and vehicle exhaust to support 3 ABCT, 2 IBCT, and 15 battalion-level training events at PCMS per year. These assumed maximum levels are approximately three times greater than actual historical training levels, and would be approximately two times greater than the expansion of brigade-level training at PCMS. Therefore, these assumptions were carried forward as a reasonable "worst case" under the Alternative 1A.

As with existing conditions, where the 24-hour PM<sub>10</sub> concentration was modeled above the SIL, a barely perceptible visibility change may be observed at the Great Sand Dunes National Park and Preserve for a single day every three years. No other visibility changes would be expected at any other Class I areas. A 24-hour PM<sub>10</sub> concentration above the SIL for one day out of the three years modeled may be expected at the Great Sand Dunes; however, the resulting concentration of 79.5 ug/m<sup>3</sup> would be well below the NAAQS of 150 ug/m<sup>3</sup>. Notably, these effects are overwhelmingly due to the existing background levels in the areas, and not PCMS activities. All other maximum modeled NO<sub>x</sub>, SO<sub>2</sub>, and PM<sub>10</sub> annual average concentrations and short-term concentrations would be below the SILs. These effects would be minor (Fort Carson, 2008).

### 3.3.2.2.1.2 Near-Field Assessment

Emissions from ABCT maneuvers are tied closely to number and size of vehicles, number of Soldiers, and overall training intensity. The maximum daily emissions at PCMS would still be during ABCT training and would likely increase by approximately one-third due to the Proposed Action (Table 3.3-5). Because the maximum daily emissions at PCMS would increase, it is expected that the PM<sub>10</sub> and PM<sub>2.5</sub> concentrations would be higher and travel further when compared to existing conditions. Under Alternative 1A, minute incremental increase in particulate concentration would be expected more than 25 miles from PCMS; however, these changes would be indistinguishable from background levels. In addition, since these increases would be a fraction of the overall existing emissions, and it is expected that concentrations would remain below the NAAQS and CAAQS for any training scenario under Alternative 1A, effects would be minor.

### 3.3.2.2.2 IBCT Training

Long-term minor effects would be expected. IBCT training would increase air emissions from traffic during convoys and from maneuvers training. The maximum daily emissions from IBCT training would increase by approximately one-third. The total number of brigade-level training events would not change, and as with existing conditions, the frequency of these events would be sporadic.

The far-field assessment outlined above in Section 3.3.2.2.1, ABCT Training, includes "worst case" assumptions for IBCT training as well. Therefore, as with ABCT training, and for similar reasons, far-field effects would be minor. The near-field assessment outlined above in Section 3.3.2.2.1, ABCT Training, is based on the maximum daily emissions at PCMS, which is during ABCT training. IBCT training currently has, and would have under the Alternative 1A, lower daily emissions than ABCT training. Therefore, as with ABCT training and for similar reasons, near-field effects would be minor.

### **3.3.2.2.3 SBCT Training**

Long-term minor effects would be expected. SBCT training would increase air emissions from traffic during convoys and from maneuvers training. The maximum daily emissions from SBCT training would be comparable to emissions from ABCT training. The total number of brigade-level training events would not change, and as with existing conditions, the frequency of these events would be sporadic. In addition, due to the conversion of an ABCT to an SBCT, the total number of future ABCT training events and associated air emissions would likely be replaced on a one-to-one basis with proposed SBCT exercises.

The far-field assessment outlined above in Section 3.3.2.2.1, ABCT Training, includes "worst case" assumptions of 3 ABCT-, 2 IBCT-, and 15 battalion-level training events at PCMS per year. These assumed maximum levels would be approximately two or more times greater than the annual training under this alternative. Therefore, as with ABCT training, and for similar reasons, far-field effects would be minor. The near-field assessment outlined above in Section 3.3.2.2.1, ABCT Training, is based on the maximum daily emissions at PCMS, which occurs during ABCT training. The maximum daily emissions from SBCT training would be comparable to emissions from ABCT training. Therefore, as with ABCT training, and for similar reasons, near-field effects would be minor.

### **3.3.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

#### **3.3.2.3.1 ABCT, IBCT, and SBCT Training**

Section 3.3.2.2 discusses potential impacts regarding proposed BCT training activities. As analyzed within Proposed Action Alternative 1A, brigade maneuver training and reconfiguration would result in minor impacts to air quality and greenhouse gases. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts from readiness training using new tactics and equipment are discussed below.

#### **3.3.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

Aviation gunnery and flare training would not constitute any new stationary or ground base emission sources at PCMS. There would be some incremental increase in emissions from aircraft and the deployment of countermeasures. These would be short-term discrete events, well above ground level, and the dispersion of any air emissions would be rapid and effective. These effects would be negligible.

#### **3.3.2.3.3 Electronic Jamming Systems**

The use of EW technologies would not constitute any new emission sources at PCMS. The use of these systems would not generate any criteria pollutants or GHGs. These effects would be negligible.

#### **3.3.2.3.4 Laser Targeting**

The use of laser designators and range finders would not constitute any new emission sources at PCMS. The use of these systems would not generate any criteria pollutants or GHGs. These effects would be negligible.

#### **3.3.2.3.5 Demolitions Training**

Demolitions training in Training Areas 7 and 10 would not constitute any new stationary or mobile emission sources at PCMS. There would be some minute increase in emissions from the

actual detonation of the explosives. These would be short-term discrete events, and the dispersion of any air emissions would be rapid and effective. These effects would be negligible.

#### **3.3.2.3.6 UAS Training**

Increases in UAS training would constitute an incremental increase in exhaust emissions from these activities. A UAS has emissions comparable to a single engine propeller driven airplane. Based on the size of the UASs and the nature of their activities, the overall emissions from UAS activities are (and would continue to be) extremely small. The proposed operational changes and associated air emissions would be minute when compared to existing conditions. These effects would be negligible.

#### **3.3.2.3.7 UGV Training**

Training using UGV would have an incremental increase in emissions from vehicle exhaust and fugitive dust during training at PCMS. Based on the size of the vehicle (<500 pounds) and the nature of the action (bomb detection/detonation) the overall emission and fugitive dust from these activities would be extremely small. The changes would be minute when compared to existing conditions. These effects would be negligible.

#### **3.3.2.3.8 Air Space Reclassification**

The reclassification of airspace would not constitute any new emission sources at PCMS. This reclassification in and of itself would not generate any criteria pollutants or GHGs, and would more broadly distribute air operational training and associated emissions. These effects would be negligible.

#### **3.3.2.3.9 DZ Development**

The establishment of two DZs would add no new emission sources at PCMS. The establishment of the DZs would constitute a small temporary increase in dust and exhaust emissions from heavy equipment during the removal of woody vegetation at the sites. The proposed DZs would more broadly distribute air operational training and associated emissions such as fugitive dust from downwash and rotorcraft emissions. These effects would be negligible.

### **3.3.3 Mitigation Measures**

No mitigation measures would be required; impacts from the Proposed Action Alternatives would be negligible to minor. Compliance with existing regulations and permits would be required for activities associated with training proposed in the future. Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations. Specifically, Fort Carson is required to employ all practical measures to avoid creating visible emissions that are in excess of 20 percent opacity, having any visible emissions go beyond the Installation's boundaries, or creating a nuisance dust problem at PCMS. Therefore, the Army would continue to implement the Fort Carson Fugitive Dust Control Plan at PCMS (Fort Carson, 2012a).

## 3.4 Noise

### 3.4.1 Affected Environment

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's quality of life, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighting", measured in A-weighted decibels (dBA), approximates a frequency response expressing the perception of sound by humans. Sounds encountered in daily life and their dBA levels are provided in Table 3.4-1.

**Table 3.4-1. Common Sounds and Their Levels**

| Outdoor                | Sound Level (dBA) | Indoor             |
|------------------------|-------------------|--------------------|
| Motorcycle             | 100               | Subway train       |
| Tractor                | 90                | Garbage disposal   |
| Noisy restaurant       | 85                | Blender            |
| Downtown (large city)  | 80                | Ringling telephone |
| Freeway traffic        | 70                | TV audio           |
| Normal conversation    | 60                | Sewing machine     |
| Rainfall               | 50                | Refrigerator       |
| Quiet residential area | 40                | Library            |

Source: Harris, 1998.

dBA=A-weighted decibels

#### 3.4.1.1 Noise Definitions and Regulatory Authority

The dBA is a widely accepted noise metric that describes steady noise levels, although very few noises are, in fact, constant. Therefore, Day-night Sound Level (DNL) has been developed. DNL is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 p.m. to 7 a.m.). DNL is a useful descriptor for noise because: (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level ( $L_{eq}$ ) is often used to describe the overall noise environment.  $L_{eq}$  is the average sound level in dB.  $L_{max}$  is the maximum sound level in dB.

The Noise Control Act of 1972 (Public Law 92-574) directs Federal agencies to comply with applicable Federal, state, and local noise control regulations. In 1974, the USEPA provided information suggesting continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals. Colorado Noise Statute §25-12-103 sets maximum sound levels ( $L_{max}$ ) for residential land use at 55 dBA for daytime hours of 7:00 a.m. to 7:00 p.m. and nighttime  $L_{max}$  of 50 dBA

between 7:00 p.m. to 7:00 a.m. (Colorado Revised Statutes §25-12-103). Aircraft activities are specifically exempt from the state noise regulation.

### 3.4.1.2 Background Noise

Existing non-military sources of noises that can be heard in the ROI include road traffic, rail traffic, aircraft overflights, and natural sounds such as bird vocalizations, running water, and wind. Notably, there is a rail spur along part of PCMS's western/northwestern boundary and Route 350 that also aligns with the Santa Fe Trail. The surrounding land use could be described as rural or remote, and background noise levels are less than 35 dBA, particularly during quiet periods.

### 3.4.1.3 Military Noise Environment and Land Use Compatibility

The military noise environment consists primarily of three types of noise: transportation noise from aircraft and vehicles, noise from firing at small-arms ranges, and impulsive noise from large-caliber weapons firing and demolition operations. AR 200-1 defines recommended noise limits from Army activities for established uses of land with respect to environmental noise. Three noise zones are defined in the regulation:

- Zone I: Relatively quiet noise environment. Acceptable for housing, schools, medical facilities, and other noise-sensitive land uses.
- Zone II: Moderately loud noise environment. Normally not recommended for housing, schools, medical facilities, and other noise-sensitive land uses.
- Zone III: Loud noise environment. Not recommended for housing, schools, medical facilities, and other noise-sensitive land uses.

The metric used in defining noise zones for small-arms ranges is peak level (dBP). Peak level is the maximum instantaneous sound level that occurs during an acoustic event. In the case of small arms, it is the maximum instantaneous sound level made by a given weapon at a given distance. Peak level for small-arms weapons is strongly correlated with community annoyance (Hede, 1982). Other metrics used by the Army to quantify the noise environment at Army installations are the C-weighted and A-weighted day-night average sound levels (CDNL and ADNL). Table 3.4-2 outlines noise limits and zones for land use planning for small-arms firing, aircraft, and large-caliber weapons firing and demolition operations.

**Table 3.4-2. Noise Limits for Noise Zones**

| Noise Zone | General Level of Noise | Small-arms (dBP) | Aircraft (ADNL) | Large-Caliber Weapons (> 20-mm) and Demolition (CDNL) | Recommended Uses                                   |
|------------|------------------------|------------------|-----------------|-------------------------------------------------------|----------------------------------------------------|
| I          | Low                    | < 87 dBP         | < 65 dBA        | < 62 dBC                                              | noise-sensitive land uses acceptable               |
| II         | Moderate               | 87–104 dBP       | 65–75 dBA       | 62–70 dBC                                             | noise-sensitive land uses normally not recommended |
| III        | High                   | > 104 dBP        | > 75 dBA        | > 70 dBC                                              | noise-sensitive land uses not recommended          |

Source: U.S. Army, 2008a.

ADNL=A-weighted day-night average sound level; CDNL=C-weighted day-night average sound level; dBC=C-weighted decibels; dBP=peak noise level; mm=millimeter

It should be emphasized that these zones, which are often shown graphically as contours on maps, are not discrete lines that sharply divide loud areas from land largely unaffected by noise. Instead, they are planning tools that depict the general noise environment around the post based on typical activities. Areas beyond the three zones can also experience levels of appreciable noise depending upon training intensity or weather conditions.

#### 3.4.1.4 Potential for Complaints Regarding Large-Caliber Weapons and Demolition Training Noise

In Section 3.4.1.2, Military Noise Environment and Land Use Compatibility, community annoyance due to noise is assessed by averaging levels over a protracted period. This approach can be misleading because it does not assess community noise effects due to relatively infrequent, yet loud, impulsive noise events. For example, for a demolition range at which several hundred charges are detonated each year, peak sound levels can exceed 140 dB in areas where annual DNL values indicate that noise levels are recommended (i.e., within the military's Zone I) for residential land use. Therefore, to better describe the noise environment, this section discusses individual acoustical events. Peak noise contours provide the absolute maximum sound level for an individual acoustical event, not an average over several events or over a period of time like the DNL. Although not a good descriptor of the overall noise environment like the DNL, peak levels better indicate the possibility of complaints among people living near the boundary of an installation after an individual event. Table 3.4-3 outlines risk of noise complaints guidelines using peak noise levels for impulsive noise.

**Table 3.4-3. Risk of Noise Complaints by Level of Noise**

| Risk of Noise Complaints | General Description of Individual Demolition Event | Large-Caliber Weapons (> 20-mm) and Demolition |
|--------------------------|----------------------------------------------------|------------------------------------------------|
| Low                      | Audible and distant                                | < 115 dBP                                      |
| Medium                   | Clearly audible                                    | 115–130 dBP                                    |
| High                     | Loud                                               | > 130 dBP                                      |

Source: U.S. Army, 2008a.

dBP=decibel peak level; mm=millimeter

#### 3.4.1.5 PCMS Training Noise

Existing sources of noise associated with training at PCMS include air and ground based training vehicle noise as well as large- and small-caliber weapons training. The primary sources of noise are the firing of weapons, specifically large-caliber weapons such as artillery and tank main guns, as well as the operation of military aircraft. Secondary sources of noise include motor vehicle traffic consisting of cars, trucks, and tracked vehicles. The closest communities to the installation are Thatcher, approximately four miles north, and Tyrone, approximately four miles south. The closest city is Trinidad, located approximately 30 miles southwest with a population of 8,771 (U.S. Census, 2014).

The existing noise contours for small arms firing activity are illustrated in Figure 3.4-1. These noise contours represent simultaneous firing at the Combat Pistol Qualification Course (Range 1), Automated Record Fire Range (Range 3), and the Multi-Purpose Machine Gun Range (Range 7). Zone II extends beyond the western boundary less than 650 meters (2,133 feet), into undeveloped open land. There are no noise-sensitive areas within Zone II. Zone III remains approximately 350 meters (1,148 feet) within the installation boundary.

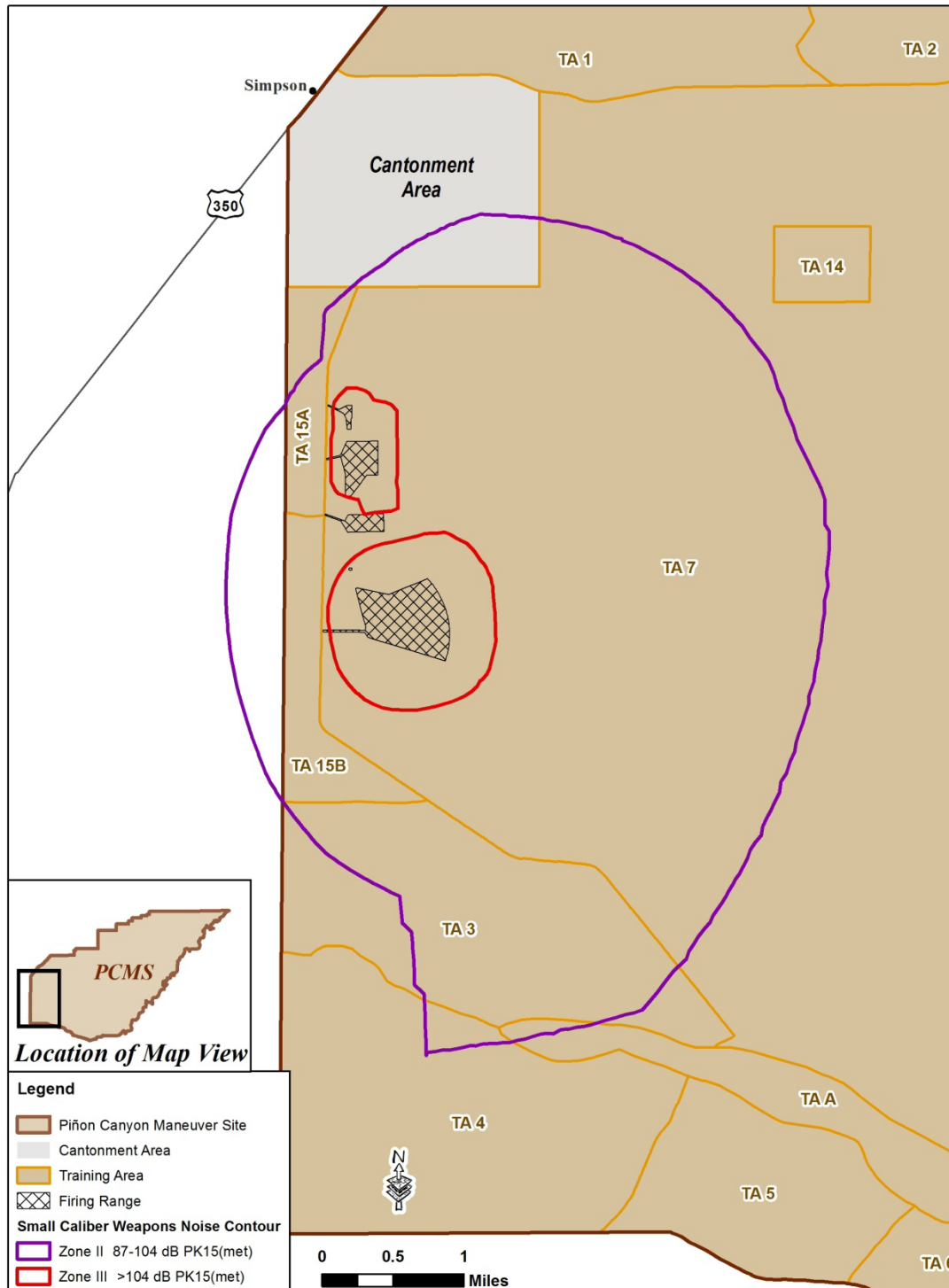


Figure 3.4-1. PCMS Combined Small Caliber Weapons Noise Contours



### 3.4.1.5.1 Non-Fixed Ranges and Non-Live Fire Activity

PCMS contains several non-fixed ranges, including the Fire and Movement Range, multiple “Combat in Cities” facilities, as well as a live-fire Shoothouse. These facilities, by virtue of the type of activity and/or their interior location, would not generate noise that is either loud or consistent enough to annoy nearby residence or communities off-post. The majority of the noise generated at these facilities would not reach the PCMS boundary or would be well below the normally incompatible (Zone II) level in Army guidelines. Maneuver training at PCMS includes the use of the MILES laser system for realistic engagement simulation. MILES accommodates up to a .50-cal blank cartridge, which would be the loudest blank used in simulation training. Again, due to the expansive training areas of PCMS, the noise levels produced by this type of training are unlikely to be audible off the installation or would be well below the normally incompatible (Zone II) level in Army guidelines.

### 3.4.1.5.2 Simulator Noise

Simulators (e.g., Grenade and Pyrotechnic Signals) are used at PCMS to create battle noises, flashes, and/or smoke during training. Table 3.4-4 gives an approximation of noise levels that would be anticipated under average weather conditions and under conditions that favor sound propagation. Under neutral weather conditions, the risk of complaints is low beyond 500 meters (1,640 feet). Under unfavorable conditions, such as during a temperature inversion, or when there is a strong wind blowing in the direction of the receiver, the distance increases to approximately 800 meters (2,625 feet). Notably, units training with simulators on PCMS remain 800 meters (2,625 feet) from the installation’s closest boundary.

**Table 3.4-4. Predicted Peak Noise Levels for Typical Army Simulators**

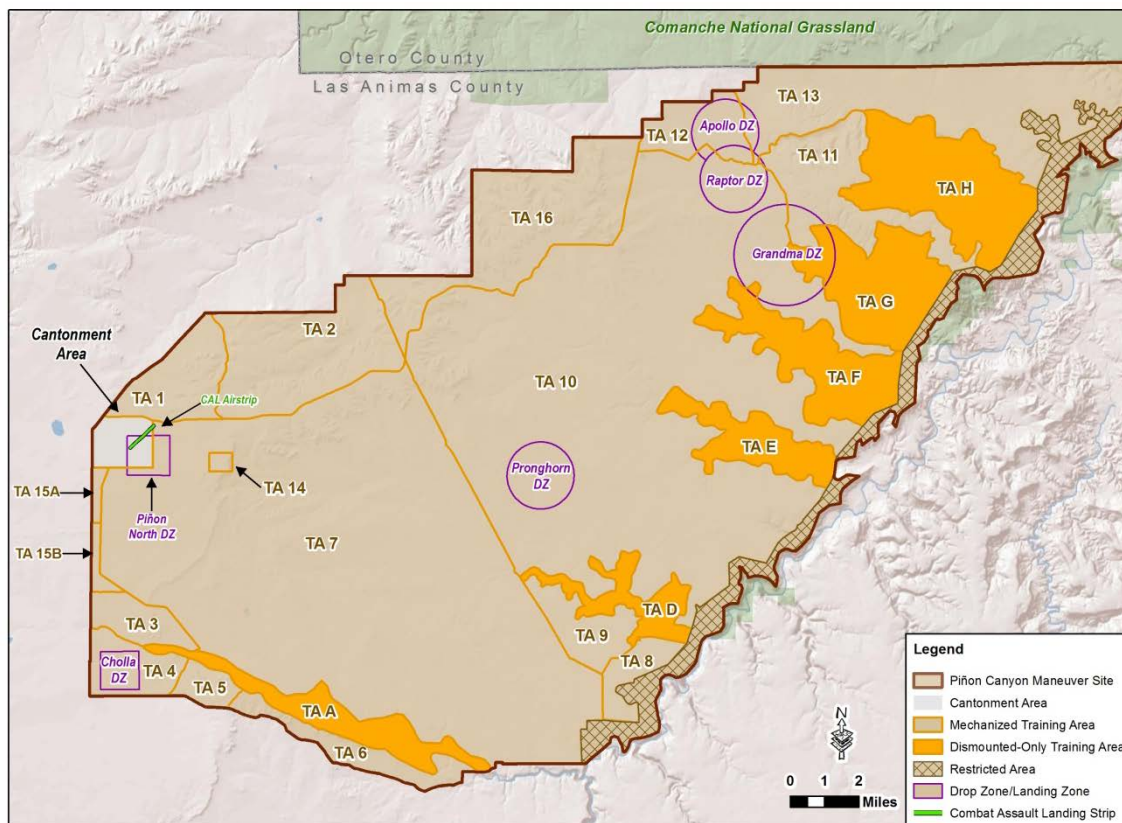
| Distance from source<br>(meters) | Neutral Weather<br>Conditions<br>PK50 (met) | Unfavorable Weather<br>Conditions PK15 (met) | Risk of Noise<br>Complaints |
|----------------------------------|---------------------------------------------|----------------------------------------------|-----------------------------|
| 100                              | 134                                         | 136                                          | High                        |
| 200                              | 125                                         | 130                                          | Medium                      |
| 300                              | 120                                         | 127                                          |                             |
| 400                              | 117                                         | 123                                          |                             |
| 500                              | 114                                         | 121                                          | Low                         |
| 600                              | 111                                         | 118                                          |                             |
| 700                              | 109                                         | 116                                          |                             |
| 800                              | 107                                         | 114                                          |                             |

Sources: USACE, 2003; US Army, 2008.

PK50(met)=Peak sound level exceeded during 50 percent of modeled weather conditions; PK15(met)=Peak sound level exceeded during 15 percent of modeled weather conditions

### 3.4.1.5.3 Aviation Activity

The majority of aviation activity at PCMS involves aviation task force support for brigade-level and some battalion-level maneuver rotations. Units also conduct their own aviation collective training apart from ground unit rotations to maintain proficiency of flight skills. DZs within PCMS and a Combat Assault Landing Strip (CALS) on the southeast corner of the cantonment area are available for aviation training (Figure 3.4-2). The CALS is primarily utilized by C-130 fixed-wing aircraft. The DZs on PCMS also serve as the primary Landing Zones (LZ) for rotary-wing aircraft.



**Figure 3.4-2. PCMS Drop Zones, Landing Zones and Combat Landing Strips**

Land use compatibility noise contours are based on average noise levels, and the low number of operations would not be enough to generate a Zone II or Zone III contour outside the PCMS boundary. Table 3.4-5 lists the calculated ADNL for PCMS LZs and the CALS based on the loudest and the most common rotary-wing aircrafts (CH-47 and UH-60) and the loudest most common fixed-wing aircrafts (C-17 and C-130). Based upon the operational parameters and the available airspace at PCMS, it is unlikely that an incompatible noise zone would ever be generated at or near the DZ or CALS. Although aviation activity at PCMS would not generate a Zone II (65 dB ADNL), there is still the potential that individual aircraft overflights to PCMS could annoy people and possibly generate complaints. A good predictor of annoyance at airfields and training routes with 50 to 200 operations per day is the  $L_{max}$  (Table 3.4-5). The Army adopted the use of long-term annoyance as a primary indicator of community response because it attempts to account for all negative aspects of effects from noise (e.g., increased annoyance due to being awakened the previous night by aircraft, and interference with everyday conversation) (U.S. Army, 2008a).

1 In general, Army helicopters flying at 1,000 feet above ground level (AGL) would highly annoy  
2 between 13 and 20 percent of individuals directly under its flight path (Table 3.4-6). Based upon  
3 the operational parameters and the available airspace at PCMS or on routes to and from PCMS,  
4 it is unlikely that an incompatible noise zone would ever be generated. Notably, air operational  
5 activities at PCMS are primarily confined to areas within the installation boundary.

**Table 3.4-5. Calculated Noise Levels for Aircraft at PCMS<sup>a</sup>**

| Number of Sorties <sup>b</sup> | Day Night Sound Levels (DNL) (dBA)             |                       |                        |                       |
|--------------------------------|------------------------------------------------|-----------------------|------------------------|-----------------------|
|                                | CH-47<br>500 feet AGL                          | UH-60<br>500 feet AGL | C-130<br>1000 feet AGL | C-17<br>1000 feet AGL |
| 1                              | 43                                             | 38                    | 42                     | 47                    |
| 2                              | 46                                             | 41                    | 45                     | 50                    |
| 4                              | 49                                             | 44                    | 48                     | 53                    |
| 8                              | 52                                             | 47                    | 51                     | 56                    |
| 16                             | 55                                             | 50                    | 54                     | 59                    |
| 32                             | 58                                             | 53                    | 57                     | 62                    |
| 64                             | 61                                             | 56                    | 60                     | 64                    |
| Distance (feet)                | Maximum Sound Levels (L <sub>max</sub> ) (dBA) |                       |                        |                       |
|                                | CH-47                                          | UH-60                 | C-130                  | C-17                  |
| 1,000                          | 83                                             | 76                    | 83.3                   | 96.1                  |
| 2,000                          | 76                                             | 69                    | 75.9                   | 88.1                  |
| 5,000                          | 67                                             | 58                    | 65.0                   | 76.8                  |
| 10,000                         | 59                                             | 48                    | 55.6                   | 67.6                  |

Sources: USAF, 2007; USAPHC, 2012.

a. Overall sound level during run-up (i.e., take-off) used as a reasonable worst-case for in-flight operations.

b. In military aviation, a sortie is a combat mission of an individual aircraft, starting when the aircraft takes off and ending on its return. For example, one mission involving six aircraft would total six sorties.

AGL=above ground level; DNL=day-night sound level; dBA=A-weighted decibel; L<sub>max</sub>=maximum sound level in dB

6

**Table 3.4-6. Percentage of Population Highly Annoyed from Aircraft Noise**

| Maximum Sound Level (dBA) | Percentage Highly Annoyed |
|---------------------------|---------------------------|
| 70                        | 5                         |
| 75                        | 13                        |
| 80                        | 20                        |
| 85                        | 28                        |
| 90                        | 35                        |

Source: USAPHC, 2012.

dBA=A-weighted decibel

7 In addition, individual UAS overflights at PCMS generate distinct but distant acoustical events.  
8 Noise associated with the operation of UASs is comparable to small propeller driven airplanes,  
9 small armored ground vehicles, or medium trucks. Once a UAS reaches approximately 3,000

feet AGL, it is no longer heard on the ground. Because of their relatively low noise levels, UAS operations are not commonly accounted for in determining the effects of air operational noise on communities and individuals.

#### 3.4.1.5.4 Noise from Military Vehicles

During training events, military vehicle maneuvers occur during both daytime and nighttime hours along unpaved roads and various off-road areas throughout PCMS. Ground-based training vehicles are substantially quieter than other sources of military noise including aircraft, small arms, and heavy artillery. Military vehicles, dominated by M1 Abrams, M2 Bradley Fighting Vehicles, HMMWVs, and light and medium trucks produce noise levels comparable to construction equipment and heavy trucks. Maximum sound levels for several Army tactical vehicles used at PCMS at both 50 and 100 feet are outlined in Table 3.4-7. The Stryker is expected to generate noise levels a few decibels higher than those produced by typical heavy trucks and substantially less than other heavier tracked vehicles shown below.

**Table 3.4-7. Maximum Sound Levels for Army Tactical Vehicles**

| Equipment Type         | Maximum Sound Level (dBA) |          |
|------------------------|---------------------------|----------|
|                        | 50 feet                   | 100 feet |
| M88 Recovery Vehicle   | 96.8                      | 91.5     |
| M1A1 Tank              | 89.4                      | 84.9     |
| M113 Personnel Carrier | 86.8                      | 81.9     |
| M548 Ammo Carrier      | 85.0                      | 79.0     |

Source: ANG, 2000.  
dBA=A-weighted decibel

Because vehicle speeds are low during most maneuver activities and vehicles tend to be relatively dispersed during off-road maneuvers, maneuver activities produce hourly average noise levels of less than 55 dBA at a distance of about 500 feet, with brief peaks of 65 to 70 dBA. In general, these activities are barely perceptible (i.e., just above background levels) at distances of less than one mile, and would be perceived as audible, but distant, during quieter periods of the day. Because the existing maneuvers are well inside the installation perimeter, noise levels do not create appreciable noise off-post.

### 3.4.2 Environmental Consequences

This section provides a discussion of the environmental impacts to the noise environment that would result from the No Action and Proposed Action alternatives. Impacts were primarily assessed by reviewing existing noise conditions at PCMS, and determining the potential effects Alternative 1A or Alternative 1B would have on nearby noise-sensitive areas. The extent of the noise impacts would depend on the size and nature of the project and proximity to noise sensitive land uses, such as residential areas. A significant impact to noise would (1) result in the violation of applicable Federal, state, or local noise ordinance; (2) create incompatible land uses for areas with sensitive noise receptors outside the PCMS boundary; or (3) would be loud enough to threaten or harm human health. See Section 3.7, Biological Resources, for a discussion of noise impacts on wildlife. Table 3.4-8 provides a comparison summary of anticipated level of impacts.

**Table 3.4-8. Summary of Noise Impacts**

| <b>Alternative</b>                    | <b>Negligible</b> | <b>Minor</b> | <b>Moderate</b> | <b>Significant</b> | <b>Beneficial</b> |
|---------------------------------------|-------------------|--------------|-----------------|--------------------|-------------------|
| <b>No Action</b>                      | X                 |              |                 |                    |                   |
| <b>Proposed Action Alternative 1A</b> |                   |              |                 |                    |                   |
| ABCT Training                         | X                 |              |                 |                    |                   |
| IBCT Training                         | X                 |              |                 |                    |                   |
| SBCT Training                         | X                 |              |                 |                    |                   |
| Combined Elements <sup>a</sup>        | X                 |              |                 |                    |                   |
| <b>Proposed Action Alternative 1B</b> |                   |              |                 |                    |                   |
| ABCT Training                         | X                 |              |                 |                    |                   |
| IBCT Training                         | X                 |              |                 |                    |                   |
| SBCT Training                         | X                 |              |                 |                    |                   |
| Aviation Gunnery and Flare Training   |                   | X            |                 |                    |                   |
| Electronic Jamming Systems            | X                 |              |                 |                    |                   |
| Laser Targeting                       | X                 |              |                 |                    |                   |
| Demolitions Training                  |                   |              | X               |                    |                   |
| UAS Training                          | X                 |              |                 |                    |                   |
| UGV Training                          | X                 |              |                 |                    |                   |
| Airspace Reclassification             | X                 |              |                 |                    |                   |
| DZ Development                        | X                 |              |                 |                    |                   |
| Combined Elements <sup>a</sup>        |                   |              | X               |                    |                   |

a. Overall combined level of direct impact to the noise environment would be negligible with the exception of demolitions training.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.4.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Selecting the No Action Alternative would result in no change in impact to the ambient noise environment. Installation operations and the current levels of training noise would continue without change. Fort Carson would continue to implement its IONMP at PCMS to limit the effects of noise on neighboring communities. Ambient noise conditions would remain unchanged when compared to existing conditions, as described in Section 3.4.1, Affected Environment.

### **3.4.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

Alternative 1A would have long-term negligible adverse effects to the noise environment. Activities outlined for this Alternative are essentially changes in long-term training activities, and there would be no appreciable short-term effects to noise. The increase in training intensity would incrementally increase noise at PCMS; however, the effects would be less than significant. The establishment of a BCT-level training intensity limit using SMAs and Total Task Miles to complement the 4.7-month brigade-level training period duration would have no adverse impacts on the noise environment. Additionally, there would be no change to the small-caliber weapons noise contours under Alternative 1A. As a result, a discussion of noise resulting from small-caliber weapons is not included in the following analysis. Potential impacts from BCT training under Alternative 1A are further discussed below.

#### **3.4.2.2.1 ABCT Training**

Long-term negligible effects would be expected. Ground maneuver vehicle noise would remain as described in Section 3.4.1.5.4 (Noise from Military Vehicles), and ABCT training would incrementally increase noise from traffic during convoys and from maneuvers training; however, neither change would be perceptible. The total number of brigade-level training events would not change, and as with existing conditions, the frequency of these events would be sporadic. In addition, due to the recent conversion of an ABCT to an SBCT, the total number of future ABCT training events and associated noise would likely be replaced on a one-for-one basis with proposed SBCT exercises.

#### ***Traffic Noise***

Increases in traffic volumes would have long-term negligible effects to the noise environment. A detailed description of the effects to traffic and transportation resources is presented in Section 3.10, Traffic and Transportation. A doubling in traffic volume would increase the noise level by 3 dBA, which is a barely perceptible change in noise (CDOT, 2014; FHWA, 2014). Changes in traffic during convoys to PCMS would be less than 2 percent on all off-post roadways when compared to existing conditions and would not constitute a perceptible change in the noise environment for any off-post roadway.

#### ***Noise from Military Vehicles***

As outlined in Section 3.4.1.5.4, Noise from Military Vehicles, military vehicle noise is barely perceptible at distances less than one mile, and would be perceived as audible but distant during quieter periods of the day. Under Alternative 1A, ABCT training would use the same types of vehicles and would remain well inside the installation perimeter; therefore, ABCT training would not cause appreciable noise off-post. These effects would be negligible.

#### **3.4.2.2.2 IBCT Training**

Long-term negligible effects would be expected. As with ABCT-level training, increased IBCT training intensity at PCMS would incrementally increase noise from traffic during convoys and maneuvers training; however, the noise generated during both would be barely perceptible. The total number of brigade-level training events would not change, and as with existing conditions, the frequency of these events would be sporadic.

As with ABCT-level training, increases in traffic volumes would have long-term negligible effects to the noise environment. Traffic on off-post roadways would increase by less than 2 percent when compared to existing conditions and would not constitute a perceptible change in the noise environment from any off-post roadway. IBCT training would use the same types of

vehicles and would remain well inside the installation perimeter; therefore, activities under Alternative 1A would not cause appreciable noise off-post. These effects would be negligible.

#### **3.4.2.2.3 SBCT Training**

Long-term negligible effects would be expected. As with ABCT-level training, SBCT training at PCMS would incrementally increase noise from traffic during convoys and from maneuvers training, both of which would be barely perceptible. The total number of brigade-level training events would not change, and as with existing conditions, the frequency of these events would be sporadic. In addition, due to the recent conversion of an ABCT to an SBCT, the total number of future ABCT training events and associated noise would likely be replaced on a one-for-one basis with proposed SBCT exercises.

As with ABCT-level training, increases in traffic volumes would have long-term negligible effects to the noise environment. Traffic on off-post roadways would increase less than 2 percent when compared to existing conditions and would not constitute a perceptible change in the noise environment for any off-post roadway. SBCT training would use quieter vehicles than ABCT training and would remain well inside the installation perimeter; therefore, SBCT training would not cause appreciable noise off-post. These effects would be negligible.

#### **3.4.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

Alternative 1B would have long-term moderate adverse effects to the noise environment. Activities outlined for this Alternative are essentially changes in long-term training activities, and there would be no appreciable short-term effects to noise. The addition of aviation gunnery and demolitions training at PCMS would appreciably increase noise at PCMS. All other training components under alternative 1B would have negligible effects. Potential impacts from training under Alternative 1B are further discussed below.

##### **3.4.2.3.1 ABCT, IBCT, and SBCT Training**

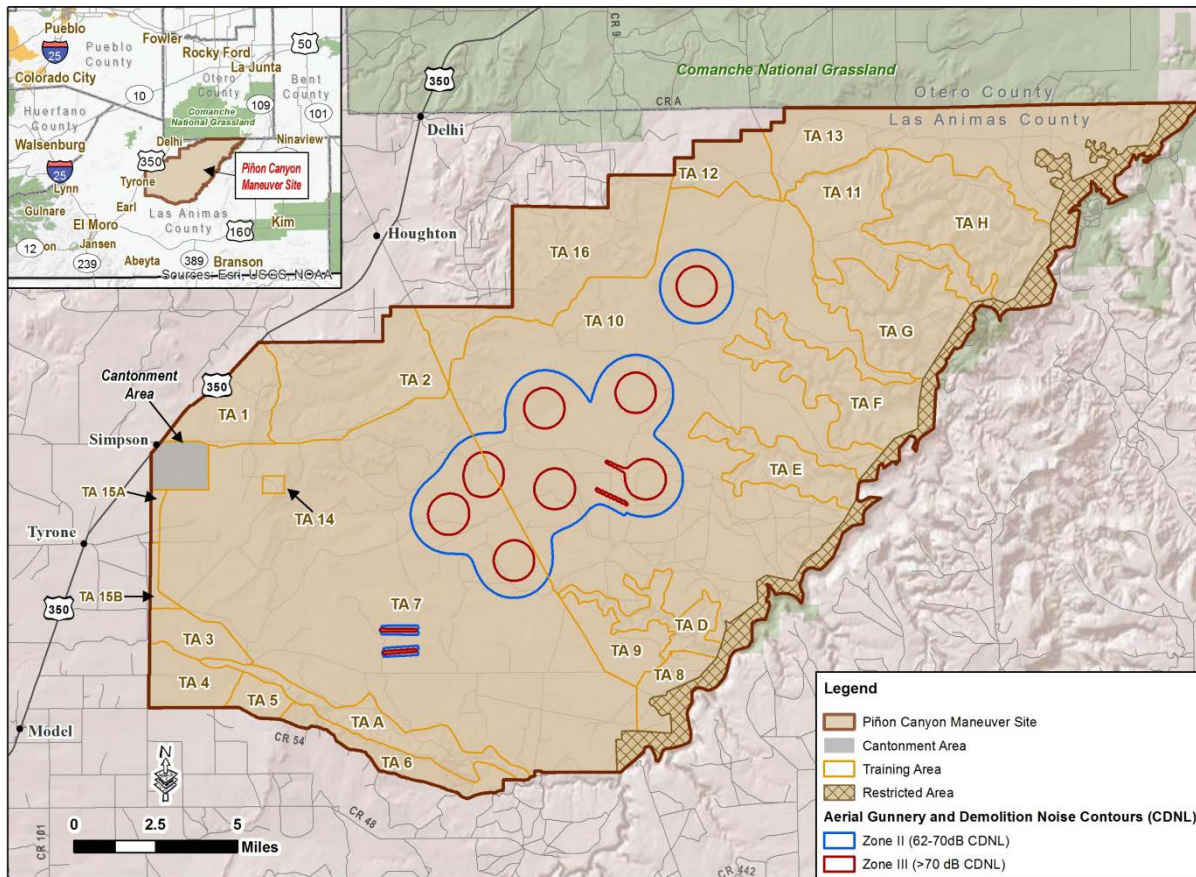
Section 3.4.2.2 discusses potential impacts regarding proposed BCT training activities. As detailed and analyzed as part of Proposed Action Alternative 1A, brigade maneuver training and reconfiguration would result in negligible impacts from noise. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts from readiness training using new tactics and equipment are discussed below.

##### **3.4.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

Long-term minor effects would be expected. The proposed aerial gunnery sites would be centrally-located within PCMS and far from the installation boundary. There would be no more than 800 non-explosive rockets utilized annually between the two sites. These would be short-term discrete events, noise from which would be primarily confined to areas within PCMS. There would be no aerial gunnery activities between the hours of 10:00 p.m. and 7:00 a.m. In addition, there would be incremental changes in noise from aircraft both at and on-route to PCMS.

The average-weighted (CDNL) contours with the implementation of the Proposed Action are shown in Figure 3.4-3. This includes both aerial gunnery and demolition noise from the proposed breach sites. With the Proposed Action, noise zone III (high levels of noise) and noise zone II (moderate levels of noise) would not extend beyond the PCMS boundary. Noise from the Proposed Action would be fully compatible with existing land uses. Therefore, impacts on the noise environment to nearby land uses would be minor.

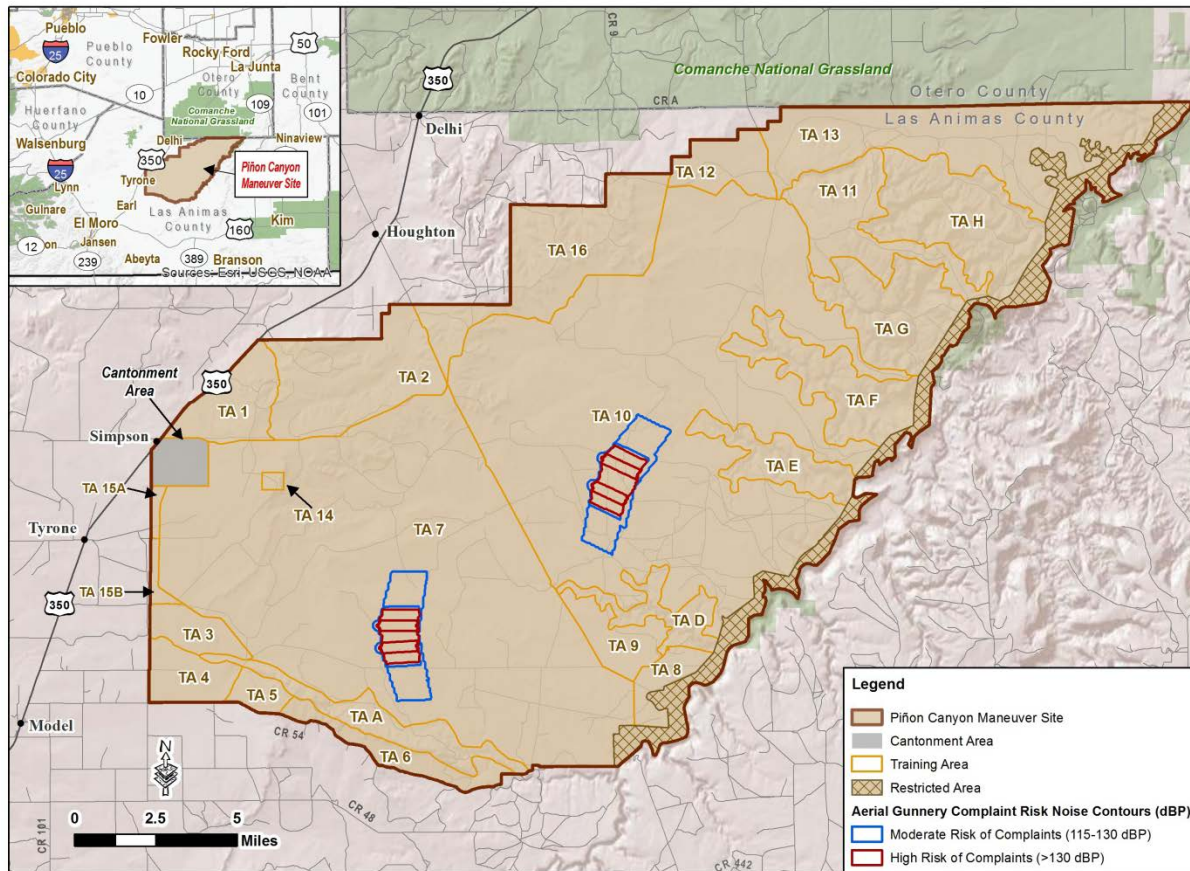




**Figure 3.4-3. Aerial Gunnery and Demolition Noise Contours (CDNL)**

The Proposed Action would introduce about 800 non-explosive rockets annually at the proposed aerial gunnery ranges. The peak noise contours from the proposed aerial gunnery activities are shown in Figure 3.4-4. With the Proposed Action, areas with low risk of noise complaints from aerial gunnery (i.e. within the 115-dBP noise contour) would not extend off PCMS; however, individual acoustic events may be audible but distant in some off-post areas. As stated above, these events would be so infrequent the changes in the overall noise environment (CDNL) would be fully compatible with existing land uses. Therefore, impacts from individual events on the noise environment would be minor.





**Figure 3.4-4. Aerial Gunnery Complaint Risk Noise Contours (dBP)**

The proposed aerial gunnery training would not constitute a distinct and appreciable change in the overall noise environment. These effects would be minor.

#### 3.4.2.3.3 Electronic Jamming Systems

The use of EW technologies during training would not change the noise environment at PCMS, as the use of these systems would not generate noise. These effects would be negligible.

#### 3.4.2.3.4 Laser Targeting

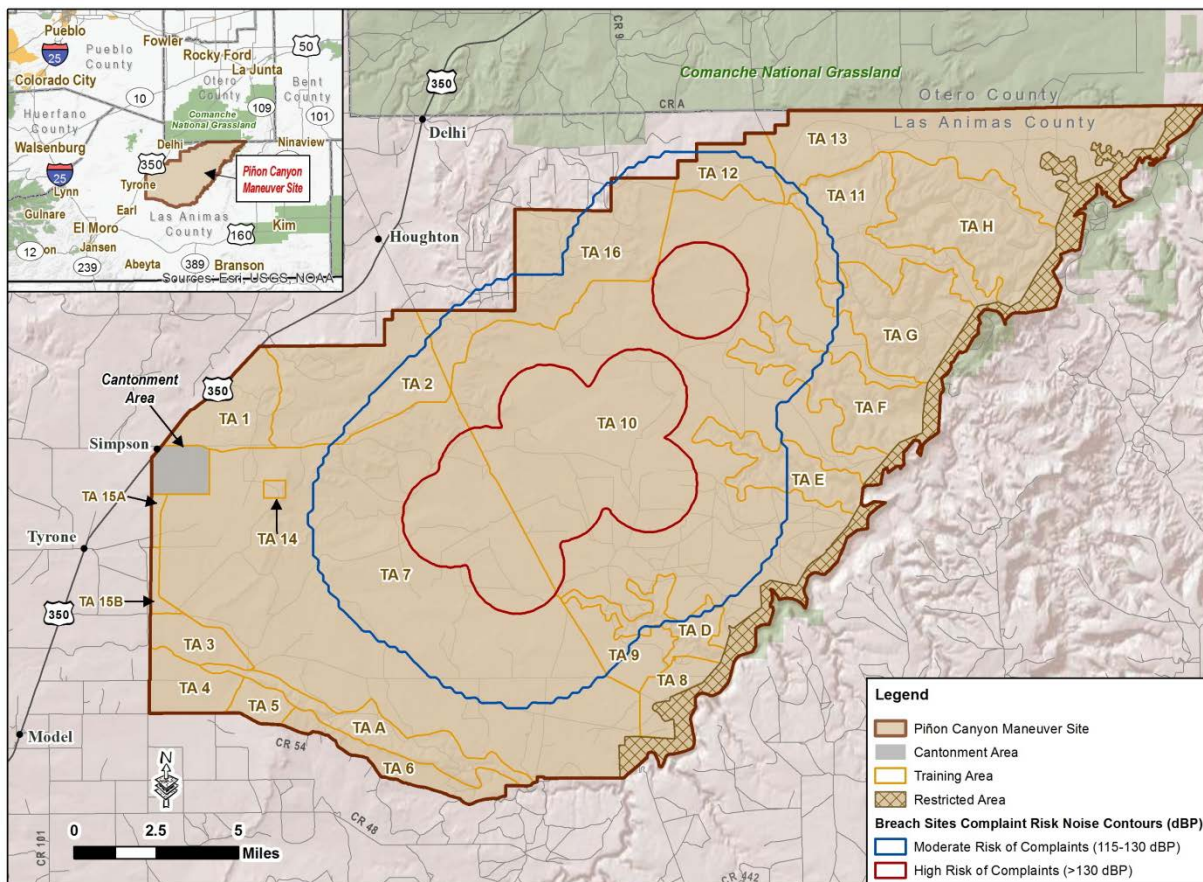
The use of vehicle-mounted or dismounted laser designators during training would not change the noise environment at PCMS, as the use of these systems would not generate noise. These effects would be negligible.

#### 3.4.2.3.5 Demolitions Training

The proposed breach sites would be centrally located within PCMS and far from the installation boundary. There would be no more than a total of 960 charges distributed amongst the eight sites annually. These would consist of individual charges of no greater than 25-pounds of C4 with no more than 40 percent (384 individual charges) between the hours of 10:00 p.m. and 7:00 a.m.

The average-weighted (CDNL) contours with the implementation of the Proposed Action are shown in Figure 3.4-3. With the Proposed Action, noise zone III (high levels of noise) and noise zone II (moderate levels of noise) would not extend beyond the PCMS boundary. Noise from demolitions activities at the proposed breach sites would be fully compatible with existing land uses. Therefore, impacts on the noise environment to nearby land uses would be minor.

The Proposed Action would introduce about 960 individual demolition events at the proposed ranges. The peak noise contours with the implementation of the Proposed Action are shown in Figure 3.4-5. With the Proposed Action, areas with low risk of noise complaints and within the 115-dBP noise contour would extend about one mile off the northwestern boundary of PCMS. These areas are undeveloped. Individual acoustic events may be audible but distant for some off-post residences. As stated above, these events would be so infrequent the changes in the overall noise environment (CDNL) would be fully compatible with existing land uses. Therefore, impacts from individual events on the noise environment would be minor.



**Figure 3.4-5. Breach Sites Complaint Risk Noise Contours (dBP)**

Currently, this type of proposed demolition training does not occur at PCMS. The proposed demolitions training would constitute a distinct and appreciable change in the overall noise environment at PCMS. Although the proposed demolitions activities would have minor effects to off-post areas, these overall changes in the noise environment would have a moderate (i.e. less than significant) effect under NEPA.

### 3.4.2.3.6 UAS Training

Increased training frequency of UAS missions would have long-term negligible adverse effects on the noise environment. These effects would be due to individual UAS overflights at PCMS that would generate distinct but distant acoustical events. Because of the airspace restrictions and the limited levels of UAS noise, no residences, communities, or sensitive noise receptors would experience any notable change to the overall noise environment due to changes in UAS activities.

Noise associated with the operation of UASs would be comparable to small propeller driven airplanes, small armored ground vehicles, or medium trucks. The loudest part of a UAS landing and takeoff cycle is the run-up before take-off. Table 3.4-9 outlines the  $L_{max}$  from individual UAS overflights, assuming the run-up sound levels as the reasonable worst case. Because the UAS would normally be in flight, the actual sound levels would be less than those shown herein. These acoustical events would be similar to a small propeller airplane, and would be perceived as distinct but distant to individuals directly below the flight path. Once a UAS reaches approximately 3,000 feet AGL, it is no longer heard on the ground (Roop, 2004).

**Table 3.4-9. Maximum Sound Level in UASs<sup>a</sup>**

| Distance (feet) | Midsized Generic UAS | Shadow |
|-----------------|----------------------|--------|
| 500             | 82                   | 85     |
| 1,000           | 76                   | 76     |
| 2,000           | 70                   | 70     |
| 5,000           | 62                   | 63     |
| 10,000          | 56                   | 52     |

Sources: USAF, 2007; USACHPPM, 2003.

a. Overall sound level during run-up (i.e., take-off) used as a reasonable worst-case for in-flight operations.

dBA=A-weighted decibel; UAS=unmanned aerial system

Because of their relatively low noise levels, UAS operations are not commonly accounted for in determining the effects of air operational noise on communities and individuals living adjacent to airports and military air installations. Overall, increases in the activity from the use of Raven and Shadow UASs would translate into negligible (not distinguishable from existing) changes in the overall noise environment. No changes to existing areas of incompatible land use would be generated due to changes in UAS operations at PCMS. Due to the limited amount of noise, these activities would have a less than significant effect on the existing noise environment.

#### **3.4.2.3.7 UGV Training**

Training using UGVs would add a new vehicle at PCMS. The UGVs would create an incremental increase in noise during maneuvers training which, as outlined in Section 3.4.1.5.4, Noise from Military Vehicles, would generate few noise effects off-post. The changes in maneuvers noise from UGVs would be minute when compared to existing conditions. These effects would be negligible.

#### **3.4.2.3.8 Airspace Reclassification**

The reclassification of airspace would allow for more controlled and safer aviation training at PCMS; however, the overall level and nature of air operations would remain essentially the same when compared to existing conditions. Air operations would be confined to the proposed airspace, and noise from these activities would be confined primarily to areas within the PCMS boundary. Air operations in the reclassified airspace would be short-term discrete events and not concentrated in any one area. The overall noise from aviation activity would not perceptibly change when compared to existing conditions. Notably, reclassification itself would not change noise; however, other components of Alternative 1B dependent on RA being available would result in incremental changes in noise. For example, the proposed type of aviation gunnery is dependent on the proposed airspace reclassification. These effects would be negligible.

**3.4.2.3.9 DZ Development**

The establishment of two DZs would have an incremental change in aviation activity and associated noise at PCMS. These changes would be negligible when compared to existing conditions. Noise from these events would be confined to areas within the PCMS boundary, and overall noise from aviation activity would not perceptibly change when compared to existing conditions. There would be incremental changes in noise from aircraft both at and on-route to PCMS. As outlined in Section 3.4.1.5.3, Aviation Activity, and for similar reasons, it is unlikely that an incompatible noise zone would ever be generated. There would be no change to ground-based operations or traffic either on- or off-post. There would be no changes to rail or public transportation. These effects would be negligible.

**3.4.3 Mitigation Measures**

Impacts to the existing noise environment would be less than significant, and no mitigation would be required. Compliance with applicable Federal, state, and local noise control regulations would be required to avoid noise that exceeds acceptable sound levels.



## **3.5 Geology and Soils**

### **3.5.1 Affected Environment**

#### **3.5.1.1 Geology**

PCMS is characterized by hills and ridges connected by plains that are in turn bisected by canyons and river valleys. The highest elevations are found in the Big Arroyo Hills in the northwest portion. Other notable topographic features include the Bear Springs Hills along the northern boundary, the Black Hills and Bent Canyon in the east, and the Hogback, a basalt dike along the southern boundary. The canyon of the Purgatoire River defines the eastern boundary.

Most of PCMS is a part of the Apishapa Uplift which lies within the greater Raton physiographic province. The Apishapa Uplift consists of sedimentary deposits formed from marine sediments from shallow seas (Western Interior Seaway) during the Cretaceous period. The sediments formed primarily into sandstone, shale, and limestone, and these strata are exposed throughout PCMS. The Apishapa Uplift develops southwest to northeast with a general decline of 1 to 3 degrees, and up to 36 degrees in local areas. Small faults associated with the Uplift are found in the northern edge of PCMS.

The primary sedimentary formations underlying PCMS are (from oldest to youngest) Dakota Sandstone (Early Cretaceous), Carlile Shale, Niobrara Formation (consisting of the Smoky Hill Chalk and the Fort Hays Limestone members), and Pierre Shale (Late Cretaceous). Overlaying the sedimentary deposits in many places are surficial deposits that are non-marine and Quaternary in age, and laid down by slope wash/erosion, stream action, or wind. These deposits include colluvium, alluvium, and eolian sand (Scott, 1969, Geological Survey Bulletin). A few eolian deposits of Pleistocene age also exist. Other formations that crop out are of mostly of Jurassic and Triassic nature, are of limited extent, and are associated with the canyon areas along the eastern boarder of PCMS (Figure 3.5-1).

Elevations on PCMS range from 5,576 feet about two miles east of the Piñon Canyon CALS, to 4,262 feet in the canyons at the northeast end of the maneuver site. PCMS is in a region that has a “zone one” rating for earthquake potential on a scale of zero to four, “zone four” having the greatest potential for earthquakes (Fort Carson, 2013a; Von Guerard, 1993).

Evanoff (1998) found that PCMS contains a large number of fossils and fossil localities, ranging from dinosaur and plant beds to shell beds that were derived from an ancient sea. The lower sequence of exposed sedimentary rocks in canyons along the Purgatoire River was deposited in wind, river, lake, and shoreline environments. The upper sequence was deposited in a shallow seaway, the Western Interior Sea. Fossils of these marine rocks include clams, snails, and ammonoids. Piñon Canyon is one of few places in the Western Interior Seaway in which geographically widespread animals lived. Fossils of lower canyons include fossil logs that accumulated as log jams at the base of deep valleys. Nowhere else in the western U.S. are logs of this age known.

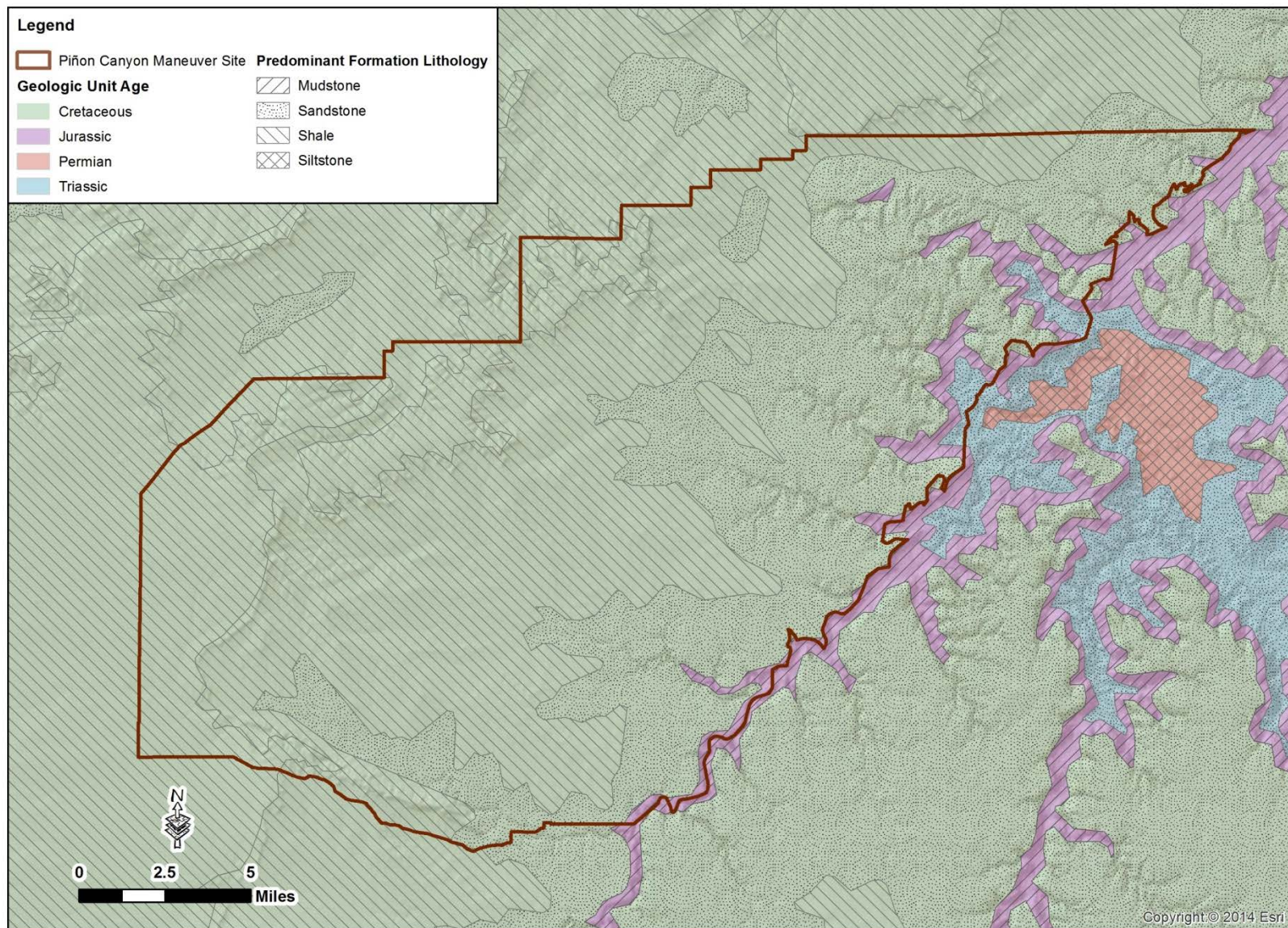


Figure 3.5-1. PCMS Formation Lithology and Geologic Age



### 3.5.1.1.1 Geologic Formations, Landscape Position, and Soil Formation

The soils at PCMS formed from materials originating from the geologic formations and/or the surficial deposits discussed in Section 3.5.1.1, Geology. The majority of the soils formed from parent materials originating from shale, sandstone, and limestone, from deposits put down during the Cretaceous Period. These include the Dakota Sandstone Formation, which consists primarily of noncalcareous brown or buff sandstone deposited during the Lower Cretaceous Period. Soils that formed from materials weathered from Dakota Sandstone include Travessilla and Villegreen. Soils originating from the Niobrara Formation, which consist of white, yellow, or grey limestone, includes Penrose and Minnequa. Pierre Shale is a gray, clayey shale, and it weathered into materials from which the Midway and Razor soils formed. The Carlile Shale is a dark gray to brown shale that formed into soils like Shingle. Vona is an example of a soil that formed in Dune Sands. Dune sands are light colored sand and coarse silt. Some soils, including Rizozo and Ovmesa, formed from materials dating from the Upper Jurassic period. These materials originate from the Morrison and Ralston Creek Formations that crop out along the southeastern PCMS boundary and northeastern section. The formations consist of reddish brown sandstone, white gypsum, and pink alabaster (NRCS, 2009).

Table 3.5-1 shows how landscape, landform, and parent material are related to the soil map units on PCMS. Soil formation is a function of time, climate, vegetation/living organisms, parent material, and relief. Table 3.5-1 has the soils grouped into similar kinds based on landscape, landform (relief) and parent material. In general, soils that formed on the plains developed thicker, more organic, rich surface soils and deeper sub soils, and have a relatively lower potential for soil erosion due to level to moderately sloping soils. Soils that formed in river valleys are almost level, and have well-developed soil profiles. Canyonlands in general have steep to very steep slopes that do not encourage soil formation, and can be highly erosive in nature.

**Table 3.5-1. Relationship Between Soil Formation and Landform**

| Soil Group                                       | Description                                                                                                                                                                                                                                   | Soil Map Unit Symbol | Map Unit Name                                                 | Landscape | Landform               | Parent Material                                                 |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------|-----------|------------------------|-----------------------------------------------------------------|
| Plains (nearly level to gently sloping alluvium) | Soils that are nearly level to gently sloping that formed in alluvium over residuum on pediments, plains, fans, terraces and drainageways; they make up 13.02 percent (30,646 acres) of PCMS, and are composed primarily of WM, and MzA soils | MzA                  | Manzanola silty clay loam, saline, 0 to 2 percent slopes      | Plains    | Drainageways, terraces | Clayey alluvium derived from shale                              |
|                                                  |                                                                                                                                                                                                                                               | WM                   | Minnequa-Wilid silt loams, 1 to 6 percent slopes              | Plains    | Pediments, plains      | Slope alluvium over residuum weathered from limestone and shale |
|                                                  |                                                                                                                                                                                                                                               | HvA                  | Haversid silt loam, 0 to 3 percent slopes                     | Plains    | Terraces               | Loamy alluvium derived from sandstone and shale                 |
|                                                  |                                                                                                                                                                                                                                               | MmA                  | Manzanola silty clay loam, dry, saline, 0 to 2 percent slopes | Plains    | Fans, terraces         | Alluvium derived from shale                                     |
|                                                  |                                                                                                                                                                                                                                               | AvC                  | Aguilar silt loam, 2 to 5 percent slopes, gullied             | Plains    | Fans, plains           | Clayey alluvium                                                 |
|                                                  |                                                                                                                                                                                                                                               | MvC                  | Manvel silt loam, 2 to 6 percent slopes                       | Plains    | Fans, plains           | Silty alluvium derived from limestone and shale                 |
|                                                  |                                                                                                                                                                                                                                               | RaB                  | Ravine silty clay loam, 1 to 5 percent slopes                 | Plains    | Pediments, plains      | Clayey alluvium over residuum weathered from shale              |



**Table 3.5-1. Relationship Between Soil Formation and Landform**

| Soil Group                                     | Description                                                                                                                                                                                              | Soil Map Unit Symbol | Map Unit Name                                           | Landscape | Landform              | Parent Material                 |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------|-----------|-----------------------|---------------------------------|
| Plains (nearly level to gently sloping eolian) | Soils that are nearly level to gently sloping that formed in eolian deposits on hills, ridges, fans, and plains; they make up 2.65 percent (6,230 acres) of PCMS, and are composed primarily of KO soils | KO                   | Kimera-Oterodry fine sandy loams, 2 to 7 percent slopes | Plains    | Hills, ridges         | Eolian deposits                 |
|                                                |                                                                                                                                                                                                          | K2D                  | Kimera-Chicosa complex, 4 to 12 percent slopes          | Plains    | Fan remnants          | Eolian deposits and/or alluvium |
|                                                |                                                                                                                                                                                                          | VoC                  | Vonid sandy loam, 0 to 5 percent slopes                 | Plains    | Hills, plains, ridges | Eolian deposits                 |
|                                                |                                                                                                                                                                                                          | FcD                  | Fort sandy loam, 1 to 8 percent slopes, cool            | Plains    | Hills, ridges, fans   | Alluvium and/or eolian deposits |

**Table 3.5-1. Relationship Between Soil Formation and Landform**

| Soil Group                                    | Description                                                                                                                                                                                   | Soil Map Unit Symbol | Map Unit Name                                    | Landscape | Landform                          | Parent Material                                  |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------|-----------|-----------------------------------|--------------------------------------------------|
| Plains (nearly level to gently sloping loess) | Soils that are nearly level to gently sloping and formed in loess on plains and fans; they make up 30.37 percent (71,469 acres) of PCMS, and are composed primarily of MzB, WV, and WyB soils | WyB                  | Wilid silt loam, 0 to 3 percent slopes           | Plains    | Plains                            | Loess                                            |
|                                               |                                                                                                                                                                                               | MzB                  | Manzanola silty clay loam, 0 to 3 percent slopes | Plains    | Plains, fans                      | Loess and alluvium derived from calcareous shale |
|                                               |                                                                                                                                                                                               | WV                   | Almagre-Villedry complex, 1 to 4 percent slopes  | Plains    | Plains, interfluves               | Loess over residuum weathered from sandstone     |
|                                               |                                                                                                                                                                                               | BaB                  | Bacid silt loam, 0 to 3 percent slopes           | Plains    | Plains                            | Loess                                            |
|                                               |                                                                                                                                                                                               | KmC                  | Wilid-Kimera complex, 2 to 9 percent slopes      | Plains    | Plains                            | Loess                                            |
|                                               |                                                                                                                                                                                               | MmB                  | Manzanola clay loam, dry, 0 to 3 percent slopes  | Plains    | Interfluves, drainageways, plains | Loess and alluvium derived from clayey shale     |

**Table 3.5-1. Relationship Between Soil Formation and Landform**

| Soil Group                                   | Description                                                                                                                                                                                                                                          | Soil Map Unit Symbol | Map Unit Name                                                | Landscape | Landform         | Parent Material                                               |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------|-----------|------------------|---------------------------------------------------------------|
| Plains (gently to strongly sloping alluvium) | Soils that are gently to strongly sloping, and formed in alluvium over residuum on scarps, hills, pediments, mesas, and cuestas; they make up 42.06 percent (98,981 acres) of PCMS and are composed of mainly TsD, PeD, MP, CaD, ShD, and PeF soils. | PeF                  | Penrose-Midway-Rock outcrop complex, 10 to 40 percent slopes | Plains    | Mesas, cuestas   | Slope alluvium over residuum weathered from limestone         |
|                                              |                                                                                                                                                                                                                                                      | CaD                  | Razor silty clay, 4 to 12 percent slopes                     | Plains    | Hills, pediments | Clayey alluvium over residuum weathered from shale            |
|                                              |                                                                                                                                                                                                                                                      | MP                   | Midway-Razor-Rock outcrop Complex, 1 to 15 percent slopes    | Plains    | Hills, pediments | Slope alluvium and residuum weathered from shale              |
|                                              |                                                                                                                                                                                                                                                      | ShD                  | Shingle-Penrose complex, 2 to 15 percent slopes              | Plains    | Hills, pediments | Slope alluvium over residuum weathered from gypsiferous shale |
|                                              |                                                                                                                                                                                                                                                      | TsD                  | Travessilla sandy loam, 1 to 9 percent slopes                | Plains    | Scarps           | Slope alluvium and residuum weathered from sandstone          |
|                                              |                                                                                                                                                                                                                                                      | PeD                  | Penrose channery loam, 1 to 15 percent slopes                | Plains    | Scarps           | Slope alluvium over residuum weathered from limestone         |
|                                              |                                                                                                                                                                                                                                                      | PM                   | Penrose-Minnequa complex, 1 to 15 percent slopes             | Plains    | Mesas, cuestas   | Slope alluvium over residuum weathered from limestone         |
|                                              |                                                                                                                                                                                                                                                      | MyD                  | Midway clay loam, 3 to 15 percent slopes, gullied            | Plains    | Hills, pediments | Slope alluvium over residuum weathered from shale             |

**Table 3.5-1. Relationship Between Soil Formation and Landform**

| Soil Group    | Description                                                                                                                                                                                                                        | Soil Map Unit Symbol | Map Unit Name                                                         | Landscape           | Landform               | Parent Material                                                    |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------|---------------------|------------------------|--------------------------------------------------------------------|
| River Valleys | River valley soils are nearly level, and mostly (LoA) formed in clayey alluvium on flood plains and terraces. Soils in active floodplains are typically mapped as GgB. River valley soils make up 1 percent (2,583 acres) of PCMS. | LoA                  | Limon silty clay loam, 0 to 1 percent slopes                          | River valleys       | Flood plains, terraces | Clayey alluvium derived from limestone and shale                   |
|               |                                                                                                                                                                                                                                    | GgB                  | Glenberg fine sandy loam, 0 to 3 percent slopes, occasionally flooded | River valleys       | Flood plains, terraces | Sandy alluvium                                                     |
| Canyonland    | Canyonland soils (TsF) are mostly formed in slope alluvium and residuum from sandstone and siltstone on scarps (escarpments). Canyonland soils make up 9.97 percent (23.458 acres) of PCMS                                         | YaC                  | Yattle fine sandy loam, 1 to 6 percent slopes                         | Canyonlands         | Fans                   | Red sandy alluvium derived from sandstone                          |
|               |                                                                                                                                                                                                                                    | VT                   | Villedry-Travessilla complex, 1 to 8 percent slopes                   | Canyonlands         | Interfluves            | Loess over residuum weathered from sandstone                       |
|               |                                                                                                                                                                                                                                    | ZR                   | Rizozo-Rock outcrop complex, 3 to 20 percent slopes                   | Canyonlands         | Scarps, mesas          | Slope alluvium and residuum weathered from sandstone and siltstone |
|               |                                                                                                                                                                                                                                    | ZRF                  | Rizozo-Rock outcrop complex, 20 to 50 percent slopes                  | Canyonlands         | Scarps, mesas          | Slope alluvium and residuum weathered from sandstone and siltstone |
|               |                                                                                                                                                                                                                                    | TsF                  | Travessilla-Rock outcrop complex, 25 to 65 percent slopes             | Canyonlands, plains | Scarps, scarps         | Slope alluvium and residuum weathered from sandstone               |
|               |                                                                                                                                                                                                                                    | TnB                  | Trementina silt loam, 0 to 2 percent slopes, dry                      | Canyonlands, plains | Terraces, terraces     | Silty alluvium derived from sandstone and shale                    |

**Table 3.5-1. Relationship Between Soil Formation and Landform**

| <b>Soil Group</b>    | <b>Description</b>                                                                                                                                                                                      | <b>Soil Map Unit Symbol</b> | <b>Map Unit Name</b>                           | <b>Landscape</b>      | <b>Landform</b>                      | <b>Parent Material</b>                                                         |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------------|-----------------------|--------------------------------------|--------------------------------------------------------------------------------|
|                      |                                                                                                                                                                                                         | SG                          | Ovmesa-Romound complex, 2 to 30 percent slopes | Plains, canyonlands   | Hills, structural benches, pediments | Slope alluvium over residuum weathered from gypsum and shale                   |
| <b>Lava Plateaus</b> | Lava plateaus soils are moderately steep to steep, and formed in colluvium on hills and basalt dikes (Hogback); they make up less than 1 percent (1,970 acres) of PCMS, and are composed entirely of Us | Us                          | Aridic Calciustolls, 15 to 35 percent slopes   | Lava plateaus, plains | Hills, hogbacks                      | Colluvium derived from basalt over residuum weathered from sandstone and shale |

### 3.5.1.2 Soils

#### 3.5.1.2.1 Nature of Soil Units and Mapping

Table 3.5-2 shows the general characteristics of soil map units on PCMS. Soils are by nature variable, so each soil map unit represents an area with several different soils and/or miscellaneous areas<sup>1</sup>. The map unit name reflects the dominant component(s) in the delineation. Razor silty clay, 4 to 12 percent slopes (CaD), is an example of a map unit with one dominant soil<sup>2</sup>. Ca is the symbol for Razor silt loam, and D denotes the degree of slope. As seen in Table 3.5-2, the Soil Map Unit column also shows the extent of the minor component soils. In the example of CaD, 85 percent of the soils in the map unit are CaD or similar soils, while 15 percent are inclusions that are too small to be delineated separately. Minor components are listed in the Las Animas Soil Survey (NRCS, 2009), but not included in Table 3.5-2. Some of the map units at PCMS are complexes. A complex is defined as when two or more dissimilar soils occur together in a way that they cannot be mapped separately at a scale of 1:24,000 (the scale of the Soil Survey maps). Shingle-Penrose complex, 2 to 15 percent slope (ShD) is an example of a complex. In this example, 65 percent of the map units are Shingle or similar soil, 23 percent are Penrose or similar soils, and 12 percent are minor components.

The listed characteristics of the map units include soil solum (surface and subsoil layer) depth, drainage class, permeability, and shrink-swell capacity. Suitability for small commercial buildings less than three stories high and without basements is based on soil properties that affect excavation and construction, such as depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Suitability for roads is based on roads with an all-weather surface designed to carry car and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the American Association of State Highway and Transportation Officials [AASHTO] group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding (NRCS, 2009).

While the suitability to small commercial buildings and roads does not directly translate into the affected environment since the roads on PCMS typically are not paved and buildings are a variety of types and dimensions, suitability ratings do add to understanding of the strength and limitations of soils for construction and load carrying purposes. Military ratings include vehicle trafficability for Type 1 and 5 vehicles in wet conditions/seasons for an average of 50 passes in the same area. Military category Type 1 vehicles are lightweight vehicles with low contact pressure (less than 2.0 pounds per square inch). Military category Type 5 vehicles are most all-wheel-drive trucks and a great number of trailed vehicles (trailers) and heavy tanks. Soils trafficability during the wet season is the capacity of soils to support vehicles in said category (Type 1 or 5). Relationships that describe the soil-vehicle interactions are based on soil

<sup>1</sup> Miscellaneous areas are areas with little or no soil that would support little or no vegetation without major reclamation. Rock outcrop is an example (NRCS, 1993 – Soil Survey Manual).

<sup>2</sup> Sometimes similar soils are included into the dominant soil(s) mapping since they for all practical purposes, have the same interpretations.

- 1 strength, slipperiness, stickiness, large surface stones, and slope, and are the basis for soil
- 2 trafficability interpretations (NRCS, 2013).

**Table 3.5-2. PCMS Soils Characteristics and Extent**

| <b>Soil Map Unit<br/>Symbol and<br/>Name</b>                                        | <b>Slope</b> | <b>Acres</b> | <b>Percent</b> | <b>Characteristics</b>                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------|--------------|--------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AvC<br>Aguilar silt loam,<br>gullied<br>(10% minor comp.)                           | 2 to 5       | 13.5         | <1             | Very deep, well drained, very slowly permeable soils with high shrink-swell capacity. May have inclusions of hydric soils. Very limited for buildings without basements and for roads due to high shrink-swell capacity. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                  |
| BaB<br>Bacid silt loam<br>(15% minor comp.)                                         | 0 to 3       | 43.5         | <1             | Very deep, well drained, slowly permeable soils with moderate shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell capacity, and for roads due to high shrink-swell capacity and low strength. Good for Type 1-5 vehicle trafficability during wet season.                                                      |
| CaD<br>Razor silty clay<br>(15% minor comp.)                                        | 4 to<br>12   | 11,084.4     | 5              | Moderately deep, well drained, slowly permeable soils with low shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell capacity and slope, and for roads due to high shrink-swell capacity, low strength and slope. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                  |
| FcD<br>Fort sandy loam,<br>cool<br>(10% minor comp.)                                | 1 to 8       | 800.1        | <1             | Very deep, well drained, moderately rapidly permeable soils with low shrink-swell capacity. Somewhat limited for buildings without basements due to high shrink-swell capacity. Very limited for roads due to high shrink-swell capacity, low strength, and frost action. Poor for Type 1 and good for Type 5 vehicle trafficability during wet season. |
| GgB<br>Glenberg fine<br>sandy loam,<br>occasionally<br>flooded<br>(15% minor comp.) | 0 to 3       | 780.1        | <1             | Very deep, well drained, slowly permeable soils with low shrink-swell capacity. Very limited for buildings without basements due to flooding, and for roads due to flooding and frost action. Good for Type 1-5 vehicle trafficability during wet season.                                                                                               |
| HvA<br>Haversid silt loam<br>(15% minor comp.)                                      | 0 to 3       | 1,212.0      | <1             | Very deep, well drained, moderately permeable soils with low shrink-swell capacity. Very limited for buildings without basements due to flooding, and for roads due to low strength, frost action, and flooding. Good for Type 1-5 vehicle trafficability during wet season.                                                                            |

**Table 3.5-2. PCMS Soils Characteristics and Extent**

| Soil Map Unit<br>Symbol and<br>Name                                                           | Slope      | Acres   | Percent | Characteristics                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------|------------|---------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K2D<br>Kimera-Chicosa<br>complex<br>(50% Kimera; 35%<br>Chicosa; 15%<br>minor comp.)          | 4 to<br>12 | 667.2   | <1      | Very deep, well to somewhat excessively drained, moderately permeable soils with low shrink-swell capacity. Somewhat (Kimera) to very (Chicosa) limited for buildings without basements at steeper slopes. Somewhat limited to roads due to frost action, low strength (Kimera), and slope (Chicosa). Good for Type 1-5 vehicle trafficability during wet season.                   |
| KmC<br>Wilid-Kimera<br>complex<br>(50% Wilid; 35%<br>Kimera; 15% minor<br>comp.)              | 2 to 9     | 4,320.6 | 2       | Very deep, well drained, moderately to moderately slowly permeable soils with low shrink-swell capacity. Not (Wilid) to somewhat (Kimera) limited for buildings without basements due to slope. Somewhat limited (Kimera) to very limited (Wilid) to roads due to low strength and frost action. Good for Type 1-5 vehicle trafficability during wet season.                        |
| KO<br>Kimera-Oterodry<br>fine sandy loams<br>(45% Kimera;<br>44%Oterodry; 10%<br>minor comp.) | 2 to 7     | 3,917.9 | 2       | Very deep, well drained, moderately to moderately rapidly permeable soils with low shrink-swell capacity. Somewhat limited for buildings without basements due to slope. Somewhat limited (Oterodry) to roads due to frost action to very limited (Wilid) to roads due to low strength and frost action. Poor for Type 1, good for Type 5 vehicle trafficability during wet season. |
| LoA<br>Limon silty clay<br>loam<br>(15% minor comp.)                                          | 0 to 1     | 1,802.8 | <1      | Very deep, well drained, slowly permeable soils with high shrink-swell capacity. Very limited for buildings without basements and to roads due to high shrink-swell capacity, slope, and flooding (roads only). Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                                                       |
| MmA<br>Manzanola silty<br>clay loam, dry,<br>saline<br>(10% minor comp.)                      | 0 to 2     | 261.2   | <1      | Deep, well drained, slowly permeable soils with high shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell capacity. Very limited for roads due to low strength and high shrink-swell capacity. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                                |
| MmB<br>Manzanola clay<br>loam, dry<br>(15% minor comp.)                                       | 0 to 3     | 982.7   | <1      | Deep, well drained, slowly permeable soils with high shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell capacity. Very limited for roads due to low strength and high shrink-swell capacity. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                                |



**Table 3.5-2. PCMS Soils Characteristics and Extent**

| <b>Soil Map Unit<br/>Symbol and<br/>Name</b>                                                                          | <b>Slope</b> | <b>Acres</b> | <b>Percent</b> | <b>Characteristics</b>                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------|--------------|--------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MP<br>Midway-Razor-<br>Rock outcrop<br>Complex<br>(40% Midway; 35%<br>Razor; 15% Rock<br>outcrop, 10%<br>minor comp.) | 1 to<br>15   | 12,203.5     | 5              | Shallow to moderately deep, well drained, slowly permeable soils with high shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell (Midway and Razor) and slope and depth to bedrock (Midway only). Very limited to roads due to high shrink-swell capacity and low strength (Midway and Razor), and slope (Midway only). Good for Type 1 and poor for Type 5 vehicle trafficability during wet season. |
| MvC<br>Manvel silt loam<br>(10% minor comp.)                                                                          | 2 to 6       | 2,688.2      | 1              | Very deep, well drained, moderately slowly permeable soils with low shrink-swell capacity. No limitations for buildings without basements. Very limited for roads due to low strength and frost action. Good for Type 1-5 vehicle trafficability during wet season.                                                                                                                                                                          |
| MyD<br>Midway clay loam,<br>gullied<br>(15% minor comp.)                                                              | 3 to<br>15   | 3,249.2      | 1              | Shallow, well drained, slowly permeable soils with high shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell, slope and depth to bedrock. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                                                                                                                                              |
| MzA<br>Manzanola silty<br>clay loam,<br>saline,<br>(15% minor comp.)                                                  | 0 to 2       | 3,598.2      | 2              | Very deep, well drained, slowly permeable soils with high shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell. Very limited for roads due to low strength and high shrink-swell capacity. Good for Type 1-5 vehicle trafficability during wet season.                                                                                                                                               |
| MzB<br>Manzanola silty<br>clay loam<br>(15% minor comp.)                                                              | 0 to 3       | 23,409.8     | 10             | Very deep, well drained, slowly permeable soils with high shrink-swell capacity. Very limited for buildings without basements due to high shrink-swell. Very limited for roads due to low strength and high shrink-swell capacity. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                                                                                             |
| PeD<br>Penrose channery<br>loam<br>(15% minor comp.)                                                                  | 1 to<br>15   | 16,390.9     | 7              | Shallow, well drained, moderately permeable soils with low shrink-swell capacity. Very limited for buildings without basements due to slope and depth to bedrock. Very limited for roads due to depth to bedrock and frost action. Poor for Type 1 and good for Type 5 vehicle trafficability during wet season.                                                                                                                             |
| PeF<br>Penrose-Midway-<br>Rock outcrop<br>complex<br>(40% Penrose;<br>35% Midway; 15%<br>Rock outcrop; 10%<br>minor)  | 10 to<br>40  | 9,291.0      | 4              | Shallow, well drained, slowly to moderately permeable soils with low to high shrink-swell capacity. Very limited for buildings without basements due to slope and depth to bedrock (Penrose and Midway) and high shrink-swell capacity (Midway). Very limited for roads due to depth to bedrock, slope, and frost action. Good for Type 1-5 vehicle trafficability during wet season.                                                        |

**Table 3.5-2. PCMS Soils Characteristics and Extent**

| <b>Soil Map Unit<br/>Symbol and<br/>Name</b>                                                           | <b>Slope</b> | <b>Acres</b> | <b>Percent</b> | <b>Characteristics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------|--------------|--------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PM<br>Penrose-Minnequa<br>complex<br>(50% Penrose;<br>35% Minnequa;<br>10% minor comp.)                | 1 to<br>15   | 185.7        | <1             | Shallow to moderately deep, well drained, moderately permeable soils with low shrink-swell capacity. Not limited (Minnequa) to very limited (Penrose) for buildings without basements due to slope and depth to bedrock. Very limited for roads due to frost action (Penrose and Minnequa), depth to bedrock (Penrose) and low strength (Minnequa). Poor for Type 1, good for Type 5 vehicle trafficability during wet season.                                   |
| RaB<br>Ravine silty clay<br>loam<br>(15% minor comp.)                                                  | 1 to 5       | 45.7         | <1             | Moderately deep, well drained, slowly permeable soils with high shrink-swell capacity. Very limited to buildings without basements due to high shrink-swell capacity. Very limited to roads due to high shrink-swell capacity and low strength. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                                                                                                    |
| SG<br>Ovmesa-Romound<br>complex<br>(50% Ovmesa;<br>35% Romound;<br>15% minor comp.)                    | 2 to<br>30   | 649.7        | <1             | Very shallow and shallow to moderately deep, well drained, moderately permeable soils with low shrink-swell capacity. Somewhat (Romound) limited to buildings without basements due to slope to very limited (Ovmesa) due to slope and depth to bedrock. Somewhat limited (Romound) to roads due to frost action to very limited (Ovmesa) to roads due to depth to bedrock, slope, and frost action. Good for Type 1-5 vehicle trafficability during wet season. |
| ShD<br>Shingle-Penrose<br>complex<br>(65% Shingle; 23%<br>Penrose; 12%<br>minor comp.)                 | 2 to<br>15   | 10,886.6     | 5              | Shallow, well drained, moderately permeable soils with low shrink-swell capacity. Very limited to buildings without basements due to slope and depth to bedrock. Very limited to roads due to depth to bedrock, frost action, slope (Shingle and Penrose), and to low strength (Shingle only). Good for Type 1-5 vehicle trafficability during wet season.                                                                                                       |
| TnB<br>Trementina silt<br>loam,<br>dry<br>(15% minor comp.)                                            | 0 to 2       | 1.2          | <1             | Very deep, well drained, moderately permeable soils with low shrink-swell capacity. Very limited to buildings without basements due to flooding. Very limited to roads due to flooding, frost action, and low strength. Good for Type 1 and poor for Type 5 vehicle trafficability during wet season.                                                                                                                                                            |
| TsD<br>Travessilla sandy<br>loam complex<br>(75% Travessilla;<br>15% Rock outcrop;<br>10% minor comp.) | 1 to 9       | 35,690.0     | 15             | Very shallow and shallow, well drained, moderately rapidly permeable soils with low shrink-swell capacity. Very limited to buildings without basements due to slope and depth to bedrock. Very limited to roads due to depth to bedrock and frost action. Poor for Type 1, good for Type 5 vehicle trafficability during wet season.                                                                                                                             |

**Table 3.5-2. PCMS Soils Characteristics and Extent**

| <b>Soil Map Unit<br/>Symbol and<br/>Name</b>                                                                 | <b>Slope</b> | <b>Acres</b> | <b>Percent</b> | <b>Characteristics</b>                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------|--------------|--------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TsF<br>Travessilla-Rock<br>outcrop complex<br>(50% Travessilla;<br>40<br>% Rock outcrop;<br>10% minor comp.) | 25 to<br>65  | 18,893.6     | 8              | Shallow, well drained, moderately permeable soils with low shrink-swell capacity. Very limited to buildings without basements due to slope and depth to bedrock. Very limited to roads due to depth to bedrock, slope, and frost action. Poor for Type 1, fair for Type 5 vehicle trafficability during wet season.                                                                                                              |
| Us<br>Aridic Calciustolls<br>(60% aridic<br>Calciustolls; 40%<br>minor comp.)                                | 15 to<br>35  | 1,969.8      | <1             | Moderately deep to very deep, well drained, moderately permeable soils with low shrink-swell capacity. Very limited to buildings without basements due to slope. Very limited to roads due to slope, low strength, and frost action. Good for Type 1-5 vehicle trafficability during wet season.                                                                                                                                 |
| VoC<br>Vonid sandy loam<br>(15% minor comp.)                                                                 | 0 to 5       | 844.6        | <1             | Very deep, somewhat excessively drained, moderately rapidly permeable soils with low shrink-swell capacity. Somewhat limited to buildings without basements due to slope. Somewhat limited to roads due to frost action. Poor for Type 1, good for Type 5 vehicle trafficability during wet season.                                                                                                                              |
| VT<br>Villedry-Travessilla<br>complex<br>(50% Villedry; 40%<br>Travessilla; 10%<br>minor comp.)              | 1 to 8       | 770.6        | <1             | Very shallow and shallow to moderately deep, well drained, moderately slowly permeable soils with low shrink-swell capacity. Somewhat (Villedry) to very (Travessilla) limited to buildings without basements due to depth to bedrock. Very limited to roads due to depth to bedrock, frost action, (Villedry and Travessilla), and to low strength (Villedry only). Good for Type 1-5 vehicle trafficability during wet season. |
| WM<br>Minnequa-Wilid silt<br>loams<br>(50% Minnequa;<br>35% Wilid; 15%<br>minor comp.)                       | 1 to 6       | 22,827.4     | 10             | Moderately deep, well drained, moderately permeable soils with low shrink-swell capacity. No limitations to buildings without basements. Very limited to roads due low strength and frost action. Good for Type 1-5 vehicle trafficability during wet season.                                                                                                                                                                    |
| WV<br>Almagre-Villedry<br>complex<br>(45% Almagre;<br>44% Villedry; 11%<br>minor comp.)                      | 1 to 4       | 23,396.0     | 10             | Moderately deep to deep, well drained, moderately permeable soils with low shrink-swell capacity. Not (Almagre) to somewhat (Villedry) limited to buildings without basements due to depth to bedrock. Very limited to roads due to low strength and frost action, (Almagre and Villedry), and depth to bedrock (Villedry only). Good for Type 1-5 vehicle trafficability during wet season.                                     |

**Table 3.5-2. PCMS Soils Characteristics and Extent**

| Soil Map Unit<br>Symbol and<br>Name                                                   | Slope    | Acres    | Percent | Characteristics                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------|----------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WyB<br>Willid silt loam<br>(15% minor comp.)                                          | 0 to 3   | 19,316.7 | 8       | Very deep, well drained, moderately slowly permeable soils with low shrink-swell capacity. No limitations to buildings without basements. Very limited to roads due to low strength and frost action. Good for Type 1-5 vehicle trafficability during wet season.                                                                    |
| YaC<br>Yattle fine sandy loam<br>(10% minor comp.)                                    | 1 to 6   | 71.7     | <1      | Very deep, well drained, moderately rapidly permeable soils with low shrink-swell capacity. No limitations to buildings without basements. Somewhat limited to roads due to frost action. Poor for Type 1, good for Type 5 vehicle trafficability during wet season.                                                                 |
| ZR<br>Rizozo-Rock outcrop complex<br>(75% Rizozo; 15% Rock outcrop; 10% minor comp.)  | 3 to 20  | 1,438.6  | <1      | Very shallow and shallow, well drained, moderately permeable soils with low shrink-swell capacity. Very limited to buildings without basements due to slope and depth to bedrock. Very limited to roads due to depth to bedrock, slope, and frost action. Poor for Type 1, good for Type 5 vehicle trafficability during wet season. |
| ZRF<br>Rizozo-Rock outcrop complex<br>(75% Rizozo; 15% Rock outcrop; 10% minor comp.) | 20 to 50 | 1,632.7  | <1      | Very shallow and shallow, well drained, moderately permeable soils with low shrink-swell capacity. Very limited to buildings without basements due to slope and depth to bedrock. Very limited to roads due to depth to bedrock, slope, and frost action. Poor for Type 1, good for Type 5 vehicle trafficability during wet season. |

### 3.5.1.2.2 Nature of Erosion and Mapping of Erosion Factors

Soil is formed in place over hundreds, often thousands, of years. When uncovered, however, soil particles can become detached from the soil column by the impact of rain water or from the force of wind. When detached, soil particles can travel with water in the form of overland flow to surface waters, or in the air in the form of dust. At the moment the particles become suspended in runoff or in the air, soil changes from a natural resource that supports plant growth to a pollutant in the form of sediment or dust. Soil erosion can be either natural or accelerated by man-made activities. Soil erosion was and is a problem on PCMS from past range and grazing activities, to current maneuver training. While some of PCMS soils are relatively stable and level, composed of medium textured particles, many of the soils are highly erosive, situated on steep slopes, and/or composed of small particles that become easily detached.

Soil erosion is usually predicted using the Universal Soil Loss Equation (USLE). In this equation, soil loss can be estimated as a product of six factors: soil erodibility (factor K), rainfall/runoff erosivity (factor R), slope length (factor L), slope steepness (factor S), cover management (factor C), and support practice (factor P) (Weischmeier and Smith, 1978). The equation was developed for agricultural management, but factor K in particular can be used as an indicator of a soil's inherent erodibility on other management situations.

- 1 Table 3.5-3 lists various factors of soil erodibility and erosion tolerance for soil map units on
- 2 PCMS. A discussion of the erodibility factors follows Table 3.5-3.

**Table 3.5-3. Erodibility of Soils on PCMS**

| Map Unit Symbol | Slope Class <sup>a</sup>         | T Factor <sup>b</sup><br>(T/A/Y) | K-Factor <sup>c</sup> | Wind Erodibility Group <sup>d</sup> | Hydrologic Group <sup>e</sup> |
|-----------------|----------------------------------|----------------------------------|-----------------------|-------------------------------------|-------------------------------|
| AvC             | Gently sloping                   | 2                                | 0.37                  | 4L                                  | D                             |
| BaB             | Nearly level                     | 5                                | 0.43                  | 6                                   | C                             |
| CaD             | Strongly sloping                 | 3                                | 0.24                  | 4                                   | D                             |
| FcD*            | Gently sloping                   | 5                                | 0.17                  | 3                                   | B                             |
| GgB*            | Nearly level                     | 5                                | 0.28                  | 3                                   | A                             |
| HvA             | Nearly level                     | 5                                | 0.37                  | 4L                                  | B                             |
| K2D             | Strongly sloping                 | 5/4                              | 0.32/0.15             | 6/6                                 | B/B                           |
| KmC             | Gently to strongly sloping       | 5/5                              | 0.37/0.32             | 6/4L                                | C/B                           |
| KO              | Gently sloping                   | 5/5                              | 0.28/0.24             | 3/3                                 | B/A                           |
| LoA             | Nearly level                     | 5                                | 0.32                  | 4L                                  | C                             |
| MmA*            | Nearly level                     | 2                                | 0.37                  | 4L                                  | C                             |
| MmB*            | Nearly level                     | 5                                | 0.28                  | 4L                                  | C                             |
| MP              | Nearly level to strongly sloping | 2/3                              | 0.20/0.32             | 5/4                                 | D/D                           |
| MvC*            | Gently sloping                   | 5                                | 0.43                  | 4L                                  | B                             |
| MyD             | Gently to strongly sloping       | 2                                | 0.20                  | 4                                   | D                             |
| MzA*            | Nearly level                     | 5                                | 0.37                  | 4L                                  | C                             |
| MzB*            | Nearly level                     | 5                                | 0.37                  | 4L                                  | C                             |
| PeD*            | Nearly level to strongly sloping | 1                                | 0.17                  | 5                                   | D                             |
| PeF             | Moderately to very steep         | 1                                | 0.32                  | 4L                                  | D                             |
| PM**            | Gently to strongly sloping       | 1/3                              | 0.17/0.43             | 5/4L                                | D/C                           |
| RaB             | Gently sloping                   | 3                                | 0.37                  | 4L                                  | D                             |
| SG              | Gently sloping to steep          | 2/3                              | .43/.43               | 4L/4L                               | D/C                           |
| ShD             | Gently to strongly sloping       | 2/1                              | 0.32/0.32             | 4L/4L                               | D/D                           |
| TnB             | Nearly level                     | 5                                | 0.37                  | 6                                   | D                             |
| TsD             | Gently to strongly sloping       | 1                                | 0.28                  | 3                                   | D                             |
| TsF             | Moderately to very steep         | 1                                | 0.28                  | 3                                   | D                             |
| Us              | Strongly sloping to steep        | 3                                | 0.1                   | 8                                   | B                             |
| VoC             | Nearly level to gently sloping   | 5                                | 0.15                  | 3                                   | A                             |
| VT              | Gently sloping                   | 2/1                              | 0.37/0.28             | 6/3                                 | C/D                           |
| WM**            | Gently sloping                   | 3/5                              | 0.43/0.43             | 4L/6                                | C/C                           |
| WV              | Gently sloping                   | 3/2                              | 0.37/0.43             | 6/6                                 | C/C                           |
| WyB*            | Nearly level                     | 5                                | 0.43                  | 6                                   | C                             |
| YaC             | Gently sloping                   | 5                                | 0.28                  | 3                                   | A                             |

**Table 3.5-3. Erodibility of Soils on PCMS**

| Map Unit Symbol | Slope Class <sup>a</sup>           | T Factor <sup>b</sup> (T/A/Y) | K-Factor <sup>c</sup> | Wind Erodibility Group <sup>d</sup> | Hydrologic Group <sup>e</sup> |
|-----------------|------------------------------------|-------------------------------|-----------------------|-------------------------------------|-------------------------------|
| ZR              | Gently sloping to moderately steep | 1                             | 0.17                  | 5                                   | D                             |
| ZRF             | Steep to very steep                | 1                             | 0.17                  | 5                                   | D                             |

- a. Slope class based on slope gradient limits for simple slopes (NRCS, 1993 Soil Survey Manual).  
b. T factor is the maximum average annual soil erosion rate that can occur without a loss in crop productivity.  
c. K factor is indicative of a soil's erodibility by water, and is representative of the surface portion of the soil, ranging from 0 to 5 inches depending on the soil.  
d. Wind Erodibility Group is indicative of a soil's erodibility by wind and is representative of the surface portion of the soil, ranging from 0 to 5 inches depending on the soil.  
e. Hydrologic Group reflects the soils permeability and runoff potential, and ranges from Group A (high permeability/low runoff potential) to Group D (low permeability/high runoff potential).

\*indicates Accelerated Erosion Class 1; \*\*indicates Accelerated Erosion Class 2

### 1 **Erosion Factor T and Accelerated Erosion Classes**

2 Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or  
3 water that can occur on a map unit without affecting crop productivity over a sustained period.  
4 The rate is in tons per acre per year. A soil with a T factor rating of 5 T/A/Y can tolerate 5 times  
5 as much erosion without a loss in productivity compared to a soil with a T factor rating of 1  
6 T/A/Y. While crops are not growing on PCMS, erosion factor T is a good indicator of the overall  
7 soil erosion tolerance, and of the effect of erosion on a soil's ability to support plant growth, and  
8 can be used for understanding the various soil units' capacity for supporting plant growth when  
9 training areas are rehabilitated and seeded after training activities.

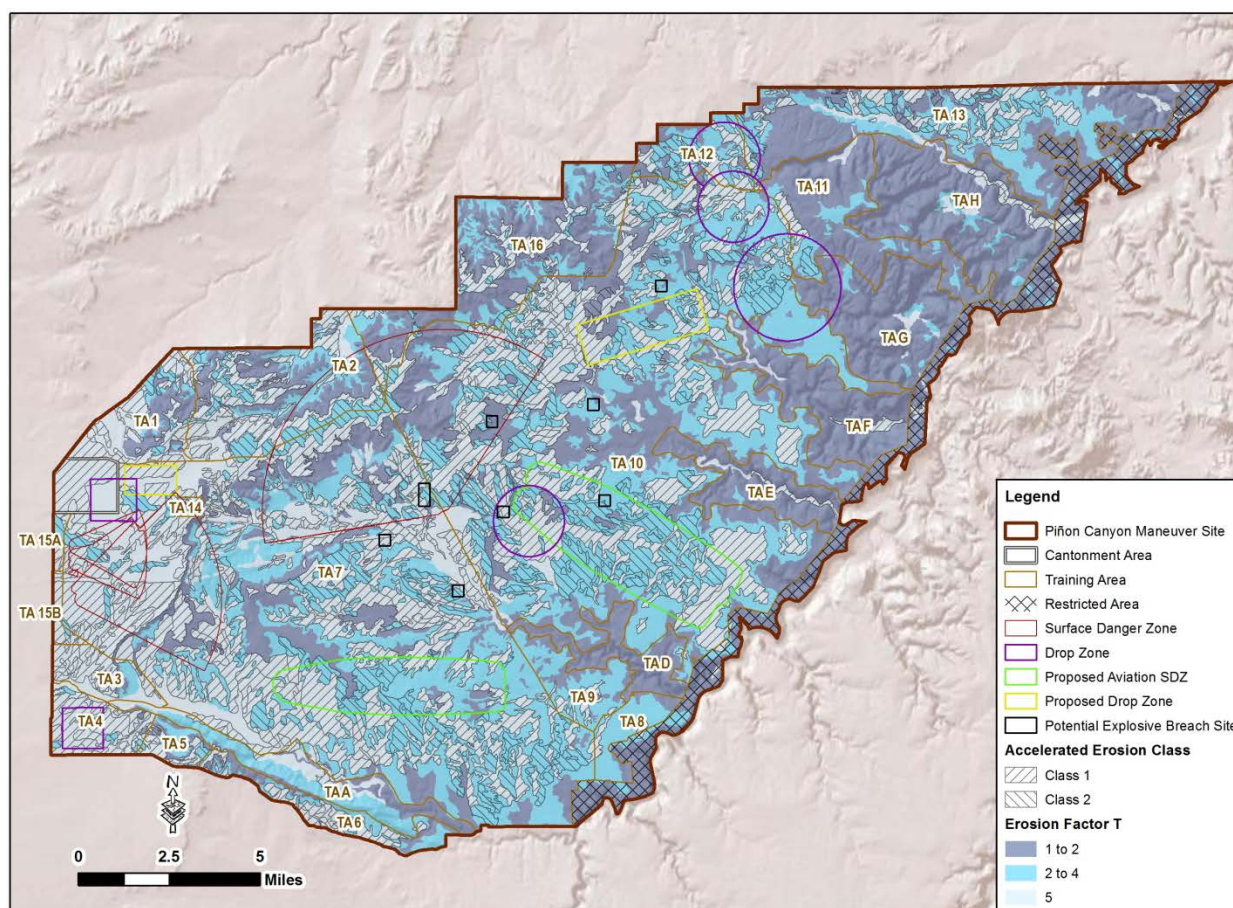
10 Soils that have been assigned a Class of Accelerated Erosion have previously been subjected  
11 to high rates of wind or water erosion, with a significant loss of soil as the result. The classes  
12 pertain to the proportion of upper horizons that have been removed. These horizons may range  
13 widely in thickness; therefore, the absolute amount of erosion is not specified. Accelerated  
14 Erosion Class 1 or 2 soils are indicated in Table 3.5-3 with one or two asterisks (\*, \*\*) following  
15 the soil map unit symbol.

- 16 • Class 1 (\*) - This class consists of soils that have lost some, but on the average less  
17 than 25 percent, of the surface soil or of the uppermost 20 centimeters of surface soil  
18 and subsoil if the original surface soil was less than 20 centimeters thick. Throughout  
19 most of the area, the thickness of the surface layer is within the normal range of  
20 variability of the uneroded soil.
- 21 • Class 2 (\*\*) - This class consists of soils that have lost, on average, 25 to 75 percent of  
22 the surface soil or of the uppermost 20 centimeters of surface soil and subsoil if the  
23 original surface soil was less than 20 centimeters thick. Throughout most cultivated  
24 areas of class 2 erosion, the surface layer consists of a mixture of the original surface  
25 soil and material from below (subsoil).

26 As shown in Table 3.5-3, a soil's T factor is not necessarily related to Erosion Class. WM is an  
27 Erosion Class 2 soil, yet has a T factor rating of 3/5 (Minnequa=3, Wilid=5). TsD, on the other  
28 hand, is not assigned an Erosion Class, but does have a T factor rating of 1. Soils on PCMS  
29 with a low soil erosion tolerance (T-factor=1 or 2) constitute 47 percent of the installation, and  
30 includes TsD, TsF, PeD, MP, ShD, MyD, and PeF. Out of these, PeD belongs to the  
31 Accelerated Erosion Class 1. None belong to Accelerated Erosion Class 2. Soils with a high soil  
32 erosion tolerance (T-factor=5) constitute 37 percent of the installation, and include MzB, WM



(Wilid component), WyB, KmC, KO, MzA, and MvC. With the exception of WM, KmC and KO, all the units belong to Accelerated Erosion Class 1. WM belong to Accelerated Erosion Class 2. Figure 3.5-2 shows that soils with low soil erosion tolerance (T-factor equal to or less than 2) are predominantly located in the Dismounted-Only Training Areas (A-H). The mechanized Training Areas (1-16) generally have soils with a higher soil erosion tolerance (higher T-factor), but also have experienced higher levels of previous soil loss (Accelerated Erosion Classes). Mechanized training on these types of soils increases the likelihood of additional loss of surface soil. As surface soil is lost, the capacity of the soil to support plant growth significantly decreases, making successful establishment of new growth after rehabilitation of the soils more difficult.



**Figure 3.5-2. Erosion Factor T and Accelerated Classes**

### **Erosion Factor K and Wind Erodibility Groups**

Erosion factor  $K^3$  indicates the erodibility of the soil based on soil texture, organic matter, soil structure, and permeability, and includes the influence of rock fragments contained in the soil. Erosion factor K is used to show a soil's susceptibility to sheet and rill erosion by water, and is one of the components of the Revised Universal Soil Loss Equation (RUSLE) that is used to predict the average annual soil loss rate on crop land. The K factor ranges in Table 3.5-3 from 0.15 to 0.43, with 0.15 being the least susceptible to sheet and rill erosion by water, and 0.43 being the most susceptible. Overall values of K can range from 0.02 to 0.69 (NRCS, 2009).

<sup>3</sup> Soil erosion Kw factor was used in this analysis. Kw factor differs from Kf factor in that it takes into account the influence of rock fragments contained in the soil.

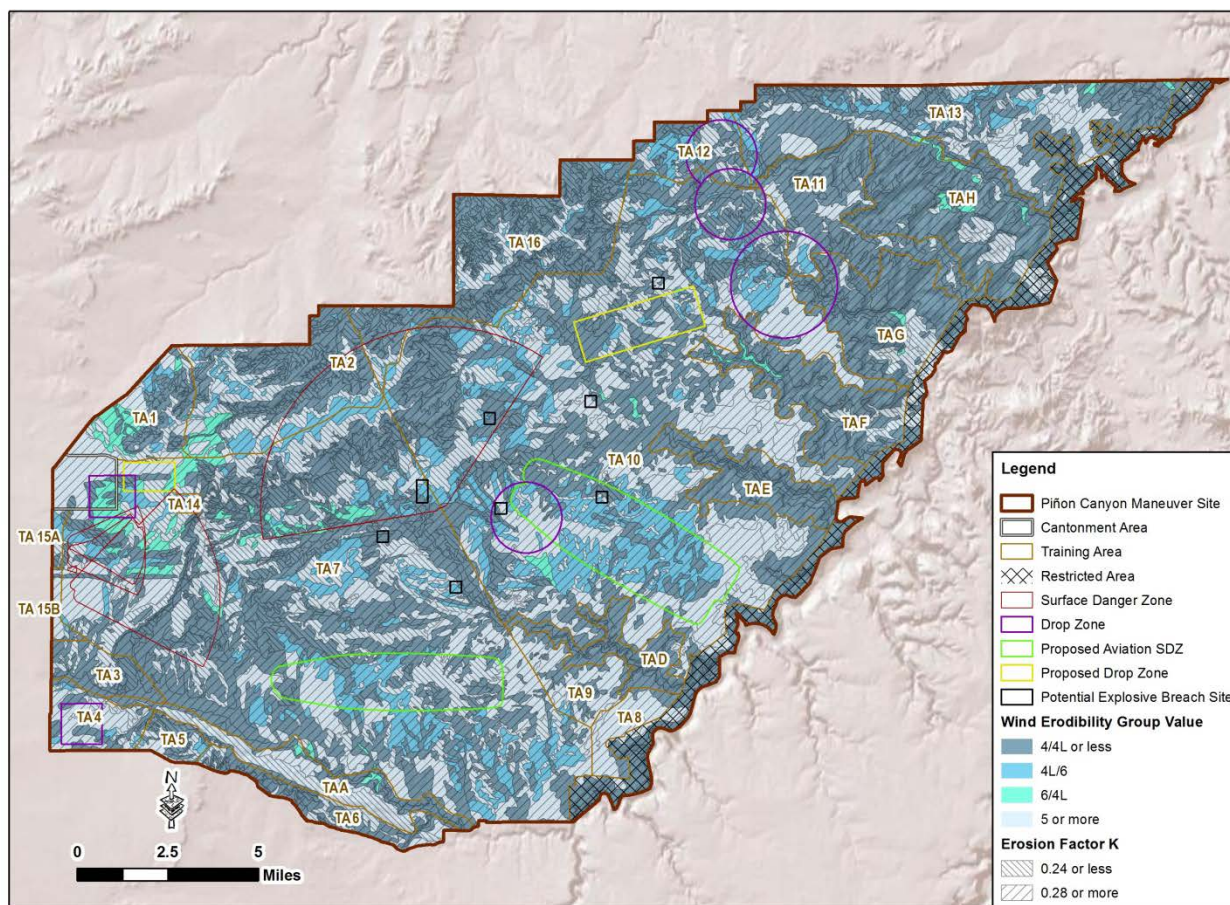
Soils on PCMS with an erosion factor K of 0.24 or less (more susceptible to water erosion) constitute 32 percent of the installation, and include WyB, TsF, PeD, CaD, and MyD. Soils with an erosion factor K of 0.28 or more (less susceptible to water erosion) constitute 61 percent of the installation, and include TsD, WV, MzB, WM, ShD, PeF, KmC, MzA, and MvC. Soil complexes with erosion K factors values ranging across the categories above (one soil having K equal or less than 0.24 and the other soil having K equal or above 0.28) constitute 7 percent and are PM, MP, KO, and K2D.

Wind erodibility groups are assigned to soils based on their inherent susceptibility to wind erosion based on soil properties, primarily soil texture and structure. The group scale runs from Group 1 (being the most susceptible) to Group 8 (being the least susceptible). The soils on PCMS range from Group 3 to 8, and are as follows (NRCS, 2009):

- Group 3: Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams
- Group 4L: Calcareous loams, silt loams, clay loams, and silty clay loams
- Group 4: Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay
- Group 5: Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material
- Group 6: Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay
- Group 8: Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness

Soils on PCMS with a wind erodibility group value of 4/4L or less (more susceptible to wind erosion) constitute 62 percent of the installation, and include TsD, MzB, TsF, PeD, CaD, ShD, and PeF. Soils with a wind erodibility group value of 5 or more (less susceptible to wind erosion) constitute 23 percent of the installation, and are composed of mostly WV and WyB. WM and MP are both soil complexes each containing two soils that range across the categories above (4L/6 and 6/4 respectively) and constitute 15 percent of the installation. Figure 3.5-3 shows that the soils more susceptible to wind erosion (lower Wind Erodibility Group) are found throughout PCMS, but soils that are more susceptible to water erosion (lower K-value) are mostly found in the mechanized training areas.





**Figure 3.5-3. Erosion Factor K and Erodibility Groups**

### **Hydrologic Groups and Slope Class**

Hydrologic Groups are based on estimates of runoff potential and permeability. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. (NRCS, 2009):

- Group A - Soils with a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well-drained to excessively-drained sands, or gravelly sands. These soils have a high rate of water transmission. Less than 1 percent of the soil units belong to Group A.
- Group B - Soils with a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well-drained or well-drained soils that have a moderately fine texture to a moderately coarse texture. These soils have a moderate rate of water transmission. Five percent of the soil units belong to Group B. The dominant soil units are KO, MvC, and Us. One of these units, KO, is a complex, whose second most widespread soil, Oterodry, belongs to Group A.
- Group C - Soils with a slow infiltration rate when thoroughly wet. These consist chiefly of soils with a layer that impedes the downward movement of water or soils of a moderately fine or fine texture. These soils have a slow rate of water transmission. Forty-three percent of the soils belong to Group C. Dominant soils units are MzB, WV, WM, and

KmC. KmC is a complex whose second most widespread soil, Kimera, belongs to Group C.

- Group D - Soils with a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission. Fifty-two percent of the soil units belong to Group D. Dominant soils units are TsD, TsF, PeD, MP, CaD, ShD, and PeF.

The slope of the soil surface highly influences the stability of the soil. Steeper soils typically promote less water infiltration and more surface runoff. While the soil map units include a variety of gradients within each polygon, the assigned slope class provides a general idea of the range of gradients:

- 22 percent are nearly level (0 to 3 percent slope)
- 24 percent are gently sloping (1 to 8 percent slope)
- 35 percent are gently to strongly sloping (1 to 16 percent slope)
- 5 percent are strongly sloping (4 to 16 percent slope)
- 5 percent are moderately steep to steep (10 to 60 percent slope)
- 10 percent are steep to very steep (20 to above 45 percent slope)

Figure 3.5-4 shows that steeper and lower permeability soils are found in the Dismounted-Only Training Areas (A-H), and in Training Areas 1, 2, 16, as well as the northeastern portion of Training Area 10 and the northern area of Training Area 7. As discussed above, most of PCMS soils have slow to very slow infiltration rates when wet, as also illustrated on Figure 3.5-4.



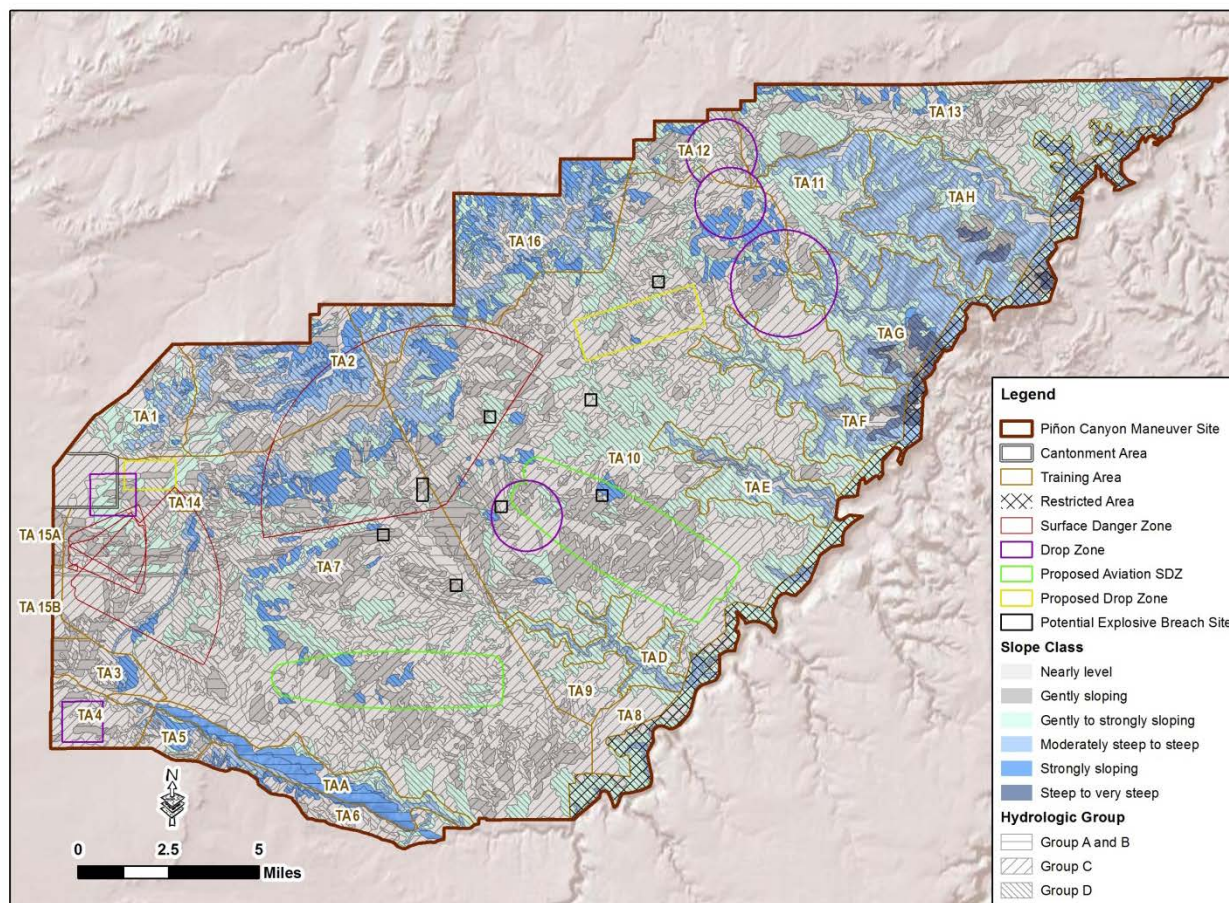


Figure 3.5-4. Hydrologic Groups and Slope Class

### Soil Moisture and Wind and Water Erosion

Aeolian soil erosion occurs when a threshold wind velocity value is reached (the wind speed at which soil particles become detached). The threshold wind velocity is dependent on soil surface features and vegetative cover. In semi-arid regions like PCMS, however, soil moisture plays a large role in soil stability and the threshold velocity value. In general, higher soil moisture increases the velocity threshold value (making soils more stable) due to larger soil cohesive forces (interparticle capillary forces) (Fecan et al., 1999). In addition, low soil moisture conditions are not conducive to germination, and therefore, make the rehabilitation of disturbed training areas difficult. Drought conditions can then present increased potential for wind erosion, and slow down the rate at which vegetation is reestablished and the land is rehabilitated. The draft PCMS vegetation cover change study done in conjunction with this EIS has indicated that drought historically has had a larger influence on vegetation loss on-site versus off-site, compared to training activities or other factors. The study also indicates that the impact of military training during two years of drought appeared to have a larger negative effect on vegetation cover during these years (VersarGMI, 2014). At PCMS, the Fort Carson Fugitive Dust Plan has measures to minimize and reduce dust emissions (see Section 3.5.1.2.3).

Dry soils, however, typically provide a more stable surface for maneuvering and training, and in general have a higher strength (weight carrying capacity) as compared to wetter soils. As soil moisture approaches saturation, surface runoff also increases, and the probability for soil water

erosion is heightened. Soil water erosion and correlation with other factors are described in more detail above.

### **3.5.1.2.3 Fort Carson Management Factors Affecting PCMS Soils**

#### ***Fort Carson/PCMS Integrated Natural Resources Management Plan (INRMP)***

In an effort to manage soil resources comprehensively on PCMS, the Fort Carson/PCMS INRMP oversees the integration of applicable environmental laws and regulations designed to protect natural resources, including soil resources. A significant part of the natural resources program deals with prevention of soil destabilization and erosion, and with rehabilitation of disturbed areas. The program includes evaluations of the soil conditions after training exercises to determine the kind and level of remediation needed, and if the area would be rotated out of use until training could be conducted on the land again.

Five basic management techniques can be used to minimize military training effects to the soil and vegetation resources: (1) limit total use, (2) redistribute use, (3) modify kinds of use, (4) alter the behavior of use, and (5) manipulate the natural resources for increased durability.

#### ***Fort Carson/PCMS ITAM Program***

The Fort Carson/PCMS ITAM program at PCMS is implemented to minimize military training effects to the soil and vegetation, including reducing the potential for soil erosion, in order to provide a quality and sustainable environment that can support training pressures without degradation of training lands. The ITAM program is responsible for inventory and monitoring of land conditions, rehabilitating lands unsuitable for training, and integrating training requirements with land capacity. The ITAM program at PCMS consists of five components: 1) RTLA used for inventory and monitoring of physical and biological resources; 2) LRAM used for programming, planning, designing, and executing land rehabilitation and maintenance programs; 3) Training Requirements Integration (TRI) used for the integration of training requirements with natural resources capabilities; 4) Sustainable Range Awareness (SRA) used for educating land users of training impacts to the environment and ways to use the land in a more sustainable way; and (5) the GIS used to accurately support planning decisions.

#### **RTLA**

Under the RTLA program, data is systematically collected to develop conceptual models to assess the training capacity of the land, develop thresholds, and to recommend boundaries and training load distribution for training land. The Shaw and Diersing (1989 and 1990) studies discussed in Section 3.5.1.2.4 were used to establish the initial RTLA (then named Land Condition Trend Analysis, or LCTA) program, and a LCTA report was developed for PCMS (Fort Carson, 1989). The location and distribution of monitoring plots on PCMS have been modified since the plots were initially established in 1989, with currently 375 plots selected and surveyed. New methodologies were implemented in 2006 to support monitoring goals and objectives of the specific assessments outlined in the RTLA Protocol (Fort Carson, 2013a). The Fort Carson ITAM office maintains the current RTLA Protocol.

Projects that involve establishing BMPs to repair maneuver damage are managed primarily under the ITAM program, and are summarized in Section 3.5.3, Mitigation Measures.

Under the ITAM program, heavily degraded training areas can be temporarily placed in the limited-use program operated by Range Operations. This allows for soil and vegetation to recover. All limited-use areas are reviewed regularly to determine their recovery status and evaluate whether and when they could be returned to the training cycle.

## **Environmental Management System (EMS)**

It is the policy of the EMS to maintain and enhance natural resources, including soils, on PCMS. This is achieved through a number of efforts, including rehabilitation of severely degraded areas to minimize downrange maneuver damage and restore soils and vegetation to prevent on- and off-post adverse impacts (FC Reg 200-1). Under the EMS, DPW would, in coordination with the ITAM program, stabilize or improve natural resource conditions as validated through the RTLA monitoring program and U.S. Geologic Survey assessments of erosion and sedimentation trend. Furthermore, downrange "Limited-Use" and "Off-Limits" areas are established by the G3 and DPTMS (FC Reg 200-1).

### **Off-Limits Areas**

Off-Limit areas on PCMS are not available for any type of training due to unsafe areas or to prevent damage to the area.

### **Dismounted-Only Training Areas**

Maneuvering in these areas is not allowed in order to protect resources and/or infrastructure. Training in dismounted-only training areas is limited to dismounted training activities only and all ground disturbing activities are requested through DPTMS, Range Division for coordination and permission in advance of the training exercise. Vehicle traffic is restricted to existing routes and trails. Major dismounted-only training areas are designated with Letters A through H (Figure 2.2-10).

### **Limited-Use Areas**

Limited-Use Areas are areas that are being rehabilitated due to training damage. Most limited-use areas are in Limited-Use status for three years, but can be taken out of this status earlier if rehabilitated, and soils and vegetation are considered stable enough to withstand military training. Units may drive through limited-use areas on existing routes or trails, and may conduct dismounted training off the routes within them. Units cannot dig, bivouac, or maneuver vehicles off the routes or trails in limited-use areas.

## **Fort Carson Regulations 350-4, 350-10, and 350-9**

FC Reg 350-4 and FC Reg 350-10 outline procedures, requirements, and policies for using ranges and training areas at PCMS. FC Reg 350-4 guidelines seek to reduce damage to soils by limiting training to trails, roads, and dismounted operations when soils are wet (amber soil conditions). If soils become saturated enough for vehicles to leave 3-inch deep tracks (red soil conditions), training should be limited to primary MSR and only dismounted (non-mechanized) operations. PCMS soil conditions (green, amber, and red) are published by Range Operations on PCMS (FC Reg 350-4, FC Reg 350-10). Section 2.5.2.2 provides additional detail regarding the color system.

Other training damage reduction measures at PCMS by mounted (mechanized) units include:

- Mounted units should only cross streams at designated stream crossing sites.
- Mounted units should maximize use of existing routes and trails, and avoid creating new routes and trails.
- Mounted units should minimize neutral steer turns, as such turns destroy vegetation, compact the soil, increase the probability of erosion, and leave evidence of operations.
- Mounted units should conduct movement into assembly or bivouac areas in vehicle columns.

- Mounted units should backfill and compact any excavations done during training.
- Mounted units should level track ruts caused by vehicle maneuver, and mounds and ridges more than 12 inches high.

FC Reg 350-9, *Integrated Training Area Management*, includes management of training lands, and integrates range and training land program mission requirements with environmental land management practices. The program includes biological assessments on the land quality and land carrying capacity, and recommendations on repairs and reconfiguration of the training sites. When needed, ITAM provides training land remediation, reconfiguration, and maintenance to sustain the training areas for all-weather training activities. As discussed in Section 4.2.4, Draft Historic Vegetation and Soil Impact Studies, historic impacts to vegetation and soils have occurred throughout PCMS. Changes implemented over the years by the Army have improved the response (i.e., vegetation recovery) to these disturbances. The AARs, RTLA reports, and LRAM projects show a track record of improvements to reduce the effects of military exercises (VersarGMI, 2014).

#### **Fort Carson Fugitive Dust Control Plan**

The Fort Carson Fugitive Dust Control Plan focuses on control measures to minimize fugitive dust emissions and to avoid exceeding the threshold levels dictated by state regulations. The plan describes all of the fugitive dust sources and the technologically feasible and economically reasonable control measures and operating procedures that can be used to minimize dust on Fort Carson and PCMS. The plan also serves as a planning tool that can be incorporated into project design and construction phases to help reduce fugitive dust emissions on Fort Carson and PCMS (Fort Carson, 2012a).

#### **3.5.1.2.4 Military Training and PCMS Soil Resources**

The effects of military training and vegetation management on soil erosion vary widely depending on the type and intensity of the activity and the location of the activity in respect to soil stability and slopes. Flash flood events are not uncommon at PCMS, and gully erosion is often a natural result of the combination of erosive soils and fast flowing, high volumes of water. This erosion can be accelerated by training activities and by construction (Fort Carson, 2013a). The draft PCMS vegetation cover change study, however, indicates that the vegetation within areas of disturbance is cumulatively the same or better than in 1984. Rest, rotation, and land rehabilitation programs (Section 3.5.1.2.3) in place at PCMS have aided in recovery (VersarGMI, 2014).

Maneuvering heavy wheeled or tracked vehicles causes a high level of disturbance to soil and vegetation, and causes accelerated wind- or water-related soil erosion (Shaw and Diersing, 1989). In particular, repeated maneuvering on a smaller area would create the most disturbances to that area, especially locations with fine-textured soils which can be difficult to rehabilitate. As the vegetation coverage decreases and soil disturbance increases as a function of maneuver passes, threshold windspeed, an indicator of soil surface wind erosion stability, decreases (Grantham et al., 2001). Vegetation management (clearing) within the training areas can also impact soil stability. Tracked vehicles cause a decrease in soil strength and an increase in soil bulk density (decrease in soil pore spaces) (Braunack, 1986). Firing of munitions into the soil causes soil disturbance and increases the potential for wind and water erosion around heavily targeted areas. Munitions firing increases the potential for fire and in turn increases the potential for soil erosion due to lack of vegetative cover.

Shaw and Diersing (1989) conducted a study of soil capacity and tracked vehicle training at PCMS, and developed allowable use estimates based on soil properties and vegetative cover.

The USLE (see Section 3.5.1.2.2) was used to calculate soil erosion tolerance rates. The study found that the high and moderate carrying capacity soils typically were upland soils, gently sloping, and supported grassland and shrubland vegetation. The low or no carrying capacity soils had shallow, rocky profiles and steeper slopes. The authors recommended that training should be concentrated on the high and moderate carrying capacity soils, and avoided on the low or no carrying capacity soils. The techniques presented in the Shaw and Diersing (1989) study, along with those presented in a study on tracked vehicle impacts on vegetation at PCMS (Shaw and Diersing, 1990) were refined and used to develop the LCTA (Land Condition Trend Analysis) program, that later became the RTLA program under ITAM (see Section 3.5.1.2.3) (Fort Carson, 1989).

G.Wang et al. (2007) conducted a study at Fort Riley, Kansas, and reported that military training takes place unevenly in space, and therefore, causes variable disturbances to ground and vegetation cover. While some areas receive high levels of disturbance, other areas are not disturbed at all, and soil and vegetation conditions improve over time. The authors proposed using soil erosion status (ES) maps developed from applying algorithms modeled from plot data and Landsat Thematic Mapper images. Using such maps would give land managers a useful tool for deciding on individual training locations and rotation of land at rest. PCMS management is currently not using ES maps when making training area decisions, however, PCMS uses other tools to accomplish similar analyses.

Soil disturbances in general are correlated with a loss of vegetative cover. Several studies have found, however, that some soil disturbance is necessary in order to maintain biodiversity. Leis et al. (2005) analyzed the effects of term disturbance from military maneuvers on vegetation and soils in a mixed prairie area, using track disturbance and soil organic matter as a measure of short- and long-term disturbance. The authors found that plant species' richness peaked at intermediate levels of soil disturbance compared to low and high levels of disturbance, and that disturbance up to intermediate levels can be used to maintain biodiversity. Odman et al. (2012) similarly found that severely disturbed habitats such as military training areas contribute to species diversity. Highly disturbed areas were found to host rare species not otherwise found in undisturbed areas. The authors concluded that soil disturbance can be used as a restoration measure particularly in dry sandy grasslands. Careful management, however, must ensure invasive exotic plants do not quickly invade the disturbed ground (VersarGMI, 2014).

### 3.5.2 Environmental Consequences

This section provides a discussion of the environmental impacts to geology and soils that would result from the No Action and Proposed Action alternatives. Impacts were primarily assessed by reviewing soil erodibility potential and determining the potential effects that training and operations would have on soils. A significant impact to geology and soils would occur if the actions prevented a sustainable landscape for military training, caused excessive soil loss which permanently impairs plant growth, or violates Federal laws. Table 3.5-4 provides a comparison summary of anticipated level of impacts.

**Table 3.5-4. Summary of Geology and Soils Impacts**

| <b>Alternative</b>                    | <b>Negligible</b> | <b>Minor</b> | <b>Moderate</b> | <b>Significant</b> | <b>Beneficial</b> |
|---------------------------------------|-------------------|--------------|-----------------|--------------------|-------------------|
| <b>No Action</b>                      |                   |              |                 | X                  |                   |
| <b>Proposed Action Alternative 1A</b> |                   |              |                 |                    |                   |
| ABCT Training                         |                   |              |                 | X                  |                   |
| IBCT Training                         |                   |              | X               |                    |                   |
| SBCT Training                         |                   |              |                 | X                  |                   |
| Combined Elements <sup>a</sup>        |                   |              |                 | X                  |                   |
| <b>Proposed Action Alternative 1B</b> |                   |              |                 |                    |                   |
| ABCT Training                         |                   |              |                 | X                  |                   |
| IBCT Training                         |                   |              | X               |                    |                   |
| SBCT Training                         |                   |              |                 | X                  |                   |
| Aviation Gunnery and Flare Training   |                   | X            |                 |                    |                   |
| Electronic Jamming Systems            | X                 |              |                 |                    |                   |
| Laser Targeting                       | X                 |              |                 |                    |                   |
| Demolitions Training                  |                   |              | X               |                    |                   |
| Unmanned Aerial Systems Training      | X                 |              |                 |                    |                   |
| Unmanned Ground Vehicle Training      | X                 |              |                 |                    |                   |
| Airspace Reclassification             | X                 |              |                 |                    |                   |
| DZ Development                        |                   | X            |                 |                    |                   |
| Combined Elements <sup>a</sup>        |                   |              |                 | X                  |                   |

a. Overall combined level of direct impact to soils could be potentially significant due to the high probability of erosion (primarily wind) from BCT maneuver training. The potential for prolonged damage from repeated, long-term use of multiple BCT units on an annual basis could cause excessive soil loss and impair plant growth.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle



### **3.5.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS**

Under the No Action Alternative, there would be no change to current training levels or Installation operations as described in Section 2.2.1 (Continue Existing Mission and Training Operations at PCMS). As shown in Section 2.5.3 (Restoration and Rehabilitation of PCMS Training Lands), the most recent ABCT training exercise during wet conditions resulted in rutting and exposure of soils within 1,200 acres, which are currently being rehabilitated. Similar potential significant impacts to soils from training with tracked vehicles would continue. Overall, the level of adverse impacts would be significant; however, impacts could be reduced to moderate through LRAM mitigation efforts in order to maintain the long-term sustainability and availability of lands for military use (also refer to Section 4.2.4, Draft Historic Vegetation and Soil Impact Studies). Existing land and environmental management programs as described in Section 2.5.2 (Protection of PCMS Resources) would continue.

### **3.5.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

#### **3.5.2.2.1 ABCT Training**

ABCT training would continue to take place in the mechanized training areas (see Figure 3.5-2). Each training event would be limited to areas identified prior to each event based on training objectives and land conditions determined under the RTLA program (Section 3.5.1.2.3). Figures 2.2-2 through 2.2-5 show examples of BCT training scenarios.

Direct impacts associated with ABCT training include loss of vegetative cover, compaction, loss of soil strength and structure, and a loss of soil through water or wind erosion. Accidental spills of hazardous materials associated with vehicles and training equipment (oils, fuels, solvents) would contaminate affected soils. As summarized in Section 3.5.1.2.4, Military Training and PCMS Soil Resources, maneuvering heavy wheeled or tracked vehicles cause high levels of soil and vegetation disturbance, and cause accelerated wind- or water-related soil erosion (Shaw and Diersing, 1989). Tracked vehicles also cause a decrease in soil strength and an increase in soil bulk density (decrease in soil pore spaces) (Braunack, 1986).

Indirect impacts of individual ABCT training events include moderately increased surface water runoff from compacted soils with less infiltration capacity and/or from bare soils. Soil not directly impacted by maneuvering, but downslope from impacted areas, would also experience moderate accelerated erosion in places, mostly in the form of sheet and rill erosion and deposition of sediment. Erosion would also cause moderate indirect impacts to nearby waterbodies in the form of suspended sediment (also see Section 3.6, Water Resources).

PCMS has large variability of soils and related properties that affect the degree of impact from ABCT training (see Section 3.5.1.2, Soils at PCMS, which also provides maps). The potential impacts to soil resources vary greatly depending on the factors discussed in Section 3.5.1.2. ABCT training would be authorized in mechanized training areas only (excluding restricted areas) (see Figure 3.2-1). Table 3.5-5 summarizes the soil erosion tolerance and susceptibility in the mechanized training areas. Figures 3.5-2, 3.5-3, and 3.5-4 show the distribution of the soil erosion parameters within the mechanized training areas.

**Table 3.5-5. Soil Erosion Parameters in Mechanized Training Areas**

| Soil Erosion Parameter                                                    | Acres   | Percent |
|---------------------------------------------------------------------------|---------|---------|
| T-value of 2 or less (low soil erosion tolerance)                         | 60,589  | 31      |
| T-value of 3 or more (high soil erosion tolerance)                        | 135,113 | 69      |
| K-value of 0.24 or less (more susceptible to water soil erosion)          | 46,518  | 24      |
| K-value of 0.28 or more (less susceptible to water soil erosion)          | 149,184 | 76      |
| Wind Erodibility Group of 4/4L or less (more susceptible to wind erosion) | 120,003 | 61      |
| Wind Erodibility Group of 5 or more (less susceptible to wind erosion)    | 75,699  | 39      |

Prominent problem soils that have very low tolerance for disturbance were summarized in Section 3.5.1.2 and include TsD, TsF, ShD, PeD, and PeF. These soils are mostly concentrated in the dismounted-only training areas (A-H); however, some have also been mapped in the mechanized training areas and would be substantially impacted by tracked vehicle training. Moreover, even though the soils in the mechanized training areas are in general more tolerant of soil disturbance compared to PCMS overall, soils susceptible to wind erosion remain prevalent (Table 3.5-5). Maneuvering in dry soils would in general have a higher adverse impact on surface stability by lowering the threshold wind velocity, causing fine soil particles to become windborne and creating dust pollution. Eolian soils or soils formed from loess are particularly susceptible to wind erosion. Soils of prominent extent that are prone to wind erosion (low Wind Erodibility Group value) include CaD, MP (Razor only), MzA, MzB, and WM (Minnequa only). Very fine textured soils (clay rich) are more prone to compaction and destruction of soil structure from the impact of tracked vehicles. Such soils include CaD, MP, MzA, and MzB.

Training impacts causing loss of vegetation, soil compaction, wind and water erosion, and loss of soil strength would be increased by repeated maneuvering over the same area and by higher speeds and tight turns. Maneuvering in wet soils would in general have higher adverse impacts on soil strength, bulk density (higher soil compaction), and soil porosity and infiltration.

Indirect impacts of individual ABCT training events would include minor to moderate increased surface water runoff from compacted soils with less infiltration capacity. Soil not directly impacted by maneuvering, but downslope from impacted areas, would also experience minor accelerated erosion in places, mostly in the form of sheet and rill erosion and deposition of sediment in other places. Erosion could also cause minor indirect impacts to nearby water bodies in the form of suspended sediment.

Due to the variability of precipitation events, individual ABCT training events have the potential to cause significant impacts in excessively dry or wet soil conditions. Also, when combined with other BCT training, and with repeated use of the same land over time, the potential for significant adverse impacts exists. Excessive soil loss and impairment of plant growth could occur if areas are not rehabilitated and seeded after training exercises, and are unable to be adequately rotated out of use for periods long enough to recover and establish vegetative cover and adequate soil stability. Significant adverse impacts could be reduced to less-than-significant (moderate) levels with implementation of mitigation measures, in particular the use of the LCTA program and recommendations, and the use of rotation and/or rest of land through the LRAM program discussed in Section 3.5.3, Mitigation Measures. Reduction to less than significant, however, may require extended years of effort or continuous effort depending on the severity of impact, and the extent of mitigation efforts. In addition, mitigation efforts depend on funding of programs such as LCTA and LRAM, which may fluctuate between funding periods.

Training intensity (i.e., increased Soldier and equipment density per ABCT-level events) would add stress to soil resources and increase the potential for soil water and wind erosion, compaction, and soil strength degradation. As described in Section 2.2.2.1, however, the Army would establish a BCT-level training intensity limit using SMAs and Total Task Miles to complement the 4.7-month brigade-level training period duration. This approach would allow the Army to manage brigade-level training periods using intensity and duration metrics, rather than just duration alone, and provide the Army with an additional measure regarding intensity of BCT training to manage training lands. The use of an additional metric to gauge training land sustainability would be an overall benefit to soil resources as the Army would cease brigade-level training when either the duration or intensity metric, whichever comes first, is attained during a training year.

#### **3.5.2.2.2 IBCT Training**

Under Alternative 1A, one IBCT training event could occur at PCMS up to one time per year (Section 2.2.2.3). IBCT-level training events would be authorized in all areas except where restricted, but are most likely to take place in dismounted-only training areas (see Section 2.2.2.3, Infantry Brigade Combat Team Training). Historically, IBCTs have only trained at Fort Carson due to individual unit flexibilities, smaller training area requirements, and availability of dismounted training areas. IBCT training level events involve mostly direct impacts to soils associated with IBCT training, including loss of vegetative cover, and a loss of soil through water or wind erosion. Soil compaction on trails and bivouac sites, and from vehicles driving on trails, is also anticipated to occur on a moderate basis. Accidental spills of hazardous materials associated with vehicles and training equipment (oils, fuels, solvents) could contaminate affected soils. Even relatively light training stresses, such as those associated with IBCT infantry, such as foot traffic and light vehicle maneuvering on trails, could have the potential to cause substantial damage to sensitive soil resources in the form of loss of vegetative cover, disturbance of soils, and associated wind erosion. IBCT-level training is likely to take place in the dismounted-only training areas (A through H), which contain a high concentration of fragile soils (Table 3.5-6, Figures 3.5-2, 3.5-3, and 3.5-4). Prominent problem soils that have very low tolerance for disturbance are summarized in Section 3.5.1.2, Soils, and in the dismounted-only areas include TsD, TsF, ShD, PeD, and PeF. As presented in Table 3.5-6, the majority of soils in dismounted-only training areas have a very low soil erosion tolerance, and are highly susceptible to wind erosion. Since many of the soils are shallow and contain a considerable proportion of rocks, they are overall less susceptible to sheet and rill erosion (K-factor). These soils, however, are in training areas A through H, and training would be limited to dismounted training only and vehicle traffic would be restricted to existing routes and trails. Annual IBCT training repeated on the same land over time could have the potential to cause moderate impacts in the form of wind erosion if the training occurs on some of the fragile, erosion-prone soils mentioned above. With the application of mitigation measures (Section 3.5.3), in particular the use of the LCTA program and recommendations, and the use of rotation and/or rest of land through the LRAM program, adverse impacts could be reduced to minor. Reduction to minor, however, may require extended years of effort or continuous effort depending on the severity of impact, and the extent of mitigation efforts. In addition, mitigation efforts often depend on funding of programs such as LCTA and LRAM, which may fluctuate between funding periods.

**Table 3.5-6. Soil Erosion Parameters in Dismounted-Only Training Areas**

| Soil Erosion Parameter                                                    | Acres  | Percent |
|---------------------------------------------------------------------------|--------|---------|
| T-value of 2 or less (low soil erosion tolerance)                         | 25,920 | 92      |
| T-value of 3 or more (high soil erosion tolerance)                        | 2,255  | 8       |
| K-value of 0.24 or less (more susceptible to water soil erosion)          | 2,222  | 8       |
| K-value of 0.28 or more (less susceptible to water soil erosion)          | 25,952 | 92      |
| Wind Erodibility Group of 4/4L or less (more susceptible to wind erosion) | 24,607 | 87      |
| Wind Erodibility Group of 5 or more (less susceptible to wind erosion)    | 3,567  | 13      |

Indirect impacts of individual IBCT training events would include minor increased surface water runoff from compacted soils with less infiltration capacity and/or from bare soils. Soil not directly impacted by dismounted maneuvering and bivouacking, but downslope from impacted areas, would also experience minor accelerated erosion in places, mostly in the form of sheet and rill erosion and deposition of sediment. Erosion would also cause minor indirect impacts to nearby water bodies in the form of suspended sediment.

Similar to ABCT training, the use of SMAs and Total Task Miles to gauge training land sustainability would be an overall benefit to soil resources (see Section 2.2.2.1).

### 3.5.2.2.3 SBCT Training

Under Proposed Action Alternative 1A, SBCT training events utilizing Soldiers equipped with Stryker vehicles would train at PCMS (Section 2.2.2.4). SBCT-level training events could take place up to once per year, and would be in mechanized training areas only (except where restricted). Impacts associated with Stryker vehicles are similar in type but lower in impact compared to those described for tracked vehicles in Section 3.5.2.2.1, ABCT Training. Stryker vehicles are lighter than the vehicles used in ABCT training, are wheeled (instead of tracked), and would maneuver at low speeds (as prescribed by Fort Carson Range Operations - maximum 30 miles per hour). SBCT training would cause less soil compaction and bulk density (from lower vehicle weight), less soil disturbance and less loss of vegetative cover (from wheeled tires), and lower associated loss of soil from water and wind erosion compared to tracked vehicles, when compared to ABCT training. Fragile soils, however, do occur in the mechanized-only areas (although at a lower concentration compared to the overall PCMS area) and up to 336 Stryker vehicles may be maneuvering during training; therefore, SBCT training events would have the potential of significant impacts to soils.

The direct and indirect impacts associated with SBCT training are similar in type but lower in impact compared to those described in Section 3.5.2.2.1, ABCT Training. When combined with ABCT training, however, and/or exercised repeatedly on the same land over time on fragile soil types, the potential exists for significant adverse impacts. Excessive soil loss and impairment of plant growth could occur if areas are not rehabilitated and seeded after training exercises, and are unable to be adequately rotated out of use for periods long enough to recover and establish vegetative cover and adequate soil stability. Significant adverse impacts could be reduced to moderate levels with implementation of the mitigation measures discussed in Section 3.5.3, Mitigation Measures. Reduction to less than significant, however, may require extended years of effort or continuous effort depending on the severity of impact, and the extent of mitigation efforts. In addition, mitigation efforts can depend on funding of programs such as LCTA and LRAM, which may fluctuate between funding periods.

Similar to ABCT training, the use of SMAs and Total Task Miles to gauge training land sustainability would be an overall benefit to soil resources (see Section 2.2.2.1).

### 3.5.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS

#### 3.5.2.3.1 ABCT, IBCT, and SBCT Training

Section 3.5.2.2 discusses potential impacts regarding proposed BCT training activities. As analyzed within Proposed Action Alternative 1A, brigade maneuver training and reconfiguration would result in potentially significant impacts to soils. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts from readiness training using new tactics and equipment are discussed below.

#### 3.5.2.3.2 Aviation Gunnery (non-explosive) and Flare Training

Aviation gunnery training and flare training would take place in existing Range 9 and two proposed new SDZs. Table 3.5-7 summarizes the soil erosion tolerance and susceptibility within the proposed SDZs. Figures 3.5-2, 3.5-3, and 3.5-4 show the distribution of the soil erosion parameters within the proposed SDZs.

**Table 3.5-7. Soil Erosion Parameters in Proposed SDZs**

| Soil Erosion Parameter                                                    | Acres  | Percent |
|---------------------------------------------------------------------------|--------|---------|
| T-value of 2 or less (low soil erosion tolerance)                         | 2,816  | 20      |
| T-value of 3 or more (high soil erosion tolerance)                        | 11,320 | 80      |
| K-value of 0.24 or less (more susceptible to water soil erosion)          | 2,811  | 20      |
| K-value of 0.28 or more (less susceptible to water soil erosion)          | 11,325 | 80      |
| Wind Erodibility Group of 4/4L or less (more susceptible to wind erosion) | 1,779  | 54      |
| Wind Erodibility Group of 5 or more (less susceptible to wind erosion)    | 1,485  | 46      |

Aviation gunnery actions would include firing non-explosive rockets and other non-explosive projectiles from the air to temporarily stationed targets, which would have the potential to cause localized areas of soils disturbance (up to small to pothole sized) from each point of impact with the ground. Direct impacts associated with aviation gunnery actions would include the modification of the soil surface and the dislocation of soil particles into the air from the impact of the rockets and ballistics. The impacts could also remove the protective vegetative cover causing soil particles to be exposed to water and wind erosion. Soil structure and strength would be degraded at the point of impact. There would be increased potential of fire from rocket launches (see Section 3.7, Biological Resources), which would remove vegetative cover and expose soil surfaces. Indirect impacts would include potentially increased dust downwind and increased water erosion and sedimentation of areas downstream from Range 9 and the proposed SDZs. While the direct and indirect impacts from single aviation gunnery events would be negligible and localized, an intensive event schedule or long-term repeated use would have the potential to result in more widespread minor adverse impacts to soils.

The Army would reduce the adverse effects caused by aviation gunnery training activities by repairing the impacted area and reseeding bare soil in accordance with the ITAM program. Per FC 350-4 and 350-10, Soldiers and vehicles would only use existing trails or approved routes

when travelling to and from training sites as a further effort to reduce potential adverse impacts to geology and soils.

Flare training would include the use of flares anywhere within PCMS (except where restricted). As discussed in Section 2.2.3.1, the flares are designed to burn out before reaching the ground and would be dispatched at 1,500 feet AGL or greater; adverse impacts to soils from flares are estimated to be negligible.

### 3.5.2.3.3 Electronic Jamming Systems

The use of electronic jamming systems and the associated training could result in minor adverse impacts from transport of Soldiers and equipment during training activities. The vehicles and equipment could disturb soil surfaces, particularly by occasional off-trail driving and by occasional accidental spills of vehicular fluids. These impacts, however, can be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

### 3.5.2.3.4 Laser Targeting

Laser targeting training would have no direct adverse impacts to geology and soils since no ground disturbing activities would occur. Transport of Soldiers and the equipment employed with the laser targeting systems (i.e., Shadows, AH-64s, handheld and vehicular systems), however, could disturb soil surfaces, particularly by occasional off-trail driving and by occasional accidental spills of vehicular fluids. These impacts, however, are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

### 3.5.2.3.5 Demolitions Training

Detonation of small quantities of explosives within the eight potential explosive breach areas in Training Areas 7 and 10 have the potential to cause minor to moderate adverse impacts to soils. Demolitions training would cause local disturbances of soils in the area of detonation impact. Depending on the location of the charge, soil disturbances could range from pothole -sized for surface charges or larger (several feet in diameter) for buried charges. Table 3.5-8 summarizes the soil erosion tolerance and susceptibility within the potential explosive breach sites. Figures 3.5-2, 3.5-3, and 3.5-4 show the distribution of the soil erosion parameters within the potential explosive beach sites.

**Table 3.5-8. Soil Erosion Parameters within Potential Explosive Breach Sites**

| Soil Erosion Parameter                                                    | Acres | Percent |
|---------------------------------------------------------------------------|-------|---------|
| T-value of 2 or less (low soil erosion tolerance)                         | 100   | 18      |
| T-value of 3 or more (high soil erosion tolerance)                        | 462   | 82      |
| K-value of 0.24 or less (more susceptible to water soil erosion)          | 51    | 9       |
| K-value of 0.28 or more (less susceptible to water soil erosion)          | 511   | 91      |
| Wind Erodibility Group of 4/4L or less (more susceptible to wind erosion) | 43    | 8       |
| Wind Erodibility Group of 5 or more (less susceptible to wind erosion)    | 218   | 92      |

The direct impacts associated with demolitions training would include modification of the soil surface and the dislocation of soil particles into the air from the impact of the explosion. The impacts would also cause the removal of protective vegetative cover causing soil particles to be

exposed to potential water and wind erosion. Soil structure and strength would be degraded at the point of impact. There could be increased potential of fire from the explosions, which would remove vegetative cover, and expose soil surfaces. Indirect impacts would include potentially increased dust downwind and increased water erosion and sedimentation of areas downstream from the directly impacted training areas. Indirect impacts would also result from transport of Soldiers and equipment during training activities. The vehicles and equipment are likely to disturb soil surfaces; however, the sites are positioned in existing maneuver corridors and locations utilized for breaching operations during previous training exercises to minimize off-road disturbances from vehicles. Other indirect impacts also include occasional accidental spills of vehicular fluids. These indirect impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable as per FC Regs 350-4 and 350-10.

While the direct and indirect impacts from single demolition training events would be minor and localized, an intensive event schedule or long-term repeated use of the same land for demolition training would have the potential to result in more widespread impact to soils, and could be moderate in nature.

The Army would reduce the adverse effects caused by demolitions training activities by repairing the impacted area and reseeding bare soil as per ITAM program guidance. Per FC Regs 350-4 and 350-10, Soldiers and vehicles would only use existing trails or approved routes when travelling to and from training sites as a further effort to reduce potential adverse impacts to geology and soils.

#### **3.5.2.3.6 UAS Training**

UAS training would have no direct adverse impacts to geology and soils since no ground disturbing activities would occur. Transport of Soldiers and equipment during training activities, however, could disturb soil surfaces, particularly by occasional off-trail driving and by occasional accidental spills of vehicular fluids. These impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

#### **3.5.2.3.7 UGV Training**

UGV training would have negligible direct impacts to geology and soils. Since the UGV equipment weighs less than 500 pounds and minimal distances would be traveled during UGV training, negligible soil disturbance would occur. Transport of Soldiers and equipment during training activities, however, could disturb soil surfaces, particularly by occasional off-trail driving and by occasional accidental spills of vehicular fluids. These impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

#### **3.5.2.3.8 Airspace Reclassification**

The reclassification of airspace would have no direct or indirect adverse impacts to geology and soils. No ground disturbing activities would occur that would have the potential to directly or indirectly adversely impact geology or soils.

#### **3.5.2.3.9 DZ Development**

Establishment of two additional DZs, including minor removal of woody vegetation (see Section 3.7, Biological Resources) and drop activities, has the potential to cause minor adverse impacts to soils. While the removal of woody vegetation is not currently planned, potential hazards for

troops utilizing the DZ would be removed, for example tree stumps or trees that are already halfway cut down. Direct impacts to soils associated with hazard removal may result in bare surfaces, exposing soils to erosion until reseeding occurs. Direct impacts also include disturbance of soils at the area of drop contact, including increase in bulk density from heavy drop loads, and an increase in water surface runoff from decreased permeability. The disturbance of soils and the crushing/destruction of vegetation from drop impact could cause increased potential for wind and water erosion. As shown in Table 3.5-9, the soils have a fairly high soil erosion tolerance (high T-values), and low susceptibility to water (K-values) and wind (Wind Erodibility Group) which would reduce the potential for soil erosion from DZ use. Figures 3.5-2, 3.5-3, and 3.5-4 show the distribution of the soil erosion parameters within the proposed DZs. Impacts could result from vehicle maneuvers during drop retrieval. The vehicles are likely to disturb soil surfaces since maneuvering away from established trails and roads is necessary for drop retrieval. Use of vehicles may also result in accidental spills of vehicular fluids. These indirect impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable as per FC Regs 350-4 and 350-10.

Direct and indirect impacts to soils from drop activities would be expected to be minor since the area of the proposed DZs is large, and the drops are not likely to occur repeatedly in the same spot. In addition, the soils in the proposed DZs are fairly erosion resistant compared to PCMS as a whole.

**Table 3.5-9. Soil Erosion Parameters in Proposed DZs**

| Soil Erosion Parameter                                                    | Acres | Percent |
|---------------------------------------------------------------------------|-------|---------|
| T-value of 2 or less (low soil erosion tolerance)                         | 956   | 29      |
| T-value of 3 or more (high soil erosion tolerance)                        | 2,308 | 71      |
| K-value of 0.24 or less (more susceptible to water soil erosion)          | 871   | 24      |
| K-value of 0.28 or more (less susceptible to water soil erosion)          | 2,804 | 76      |
| Wind Erodibility Group of 4/4L or less (more susceptible to wind erosion) | 1,779 | 54      |
| Wind Erodibility Group of 5 or more (less susceptible to wind erosion)    | 1,485 | 46      |

### 3.5.3 Mitigation Measures

Significant adverse impacts to soils caused by ABCT and SBCT training at PCMS, including loss of vegetative cover, could be moderated. Enhanced application of existing land management programs, training land rotation, and continued RTLA and LRAM efforts (as discussed in Section 2.5.2, Protection of PCMS Resources, and Section 3.5.1.2.3, Fort Carson Management Factors Affecting PCMS Soils) would be necessary to offset training impacts to soils from ABCT, IBCT, and SBCT training. Overall, changes implemented over the years by the Army have improved the response (vegetation recovery) to these disturbances (VersarGMI, 2014).

As a part of the ITAM program, Range Operations would continue to rotate training areas to allow for recovery. Rotation of training areas is used to conserve soils and restore native vegetation in specific locations. Areas are reviewed regularly to determine when the area has recovered and can be returned to the training cycle. The Fort Carson and PCMS INRMP specifies the following applications for RTLA data and information:



- 1 • Develop conceptual models to determine each ecotypes' suitability for training, including
- 2 all possible land uses
- 3 • Establish specific assessments to determine the status of the training lands as well as
- 4 the success of rehabilitation efforts once implemented
- 5 • Recommend boundaries and training load distribution for newly acquired and existing
- 6 training land, so that the training land can best support a new or changing training
- 7 mission and a new intensity load
- 8 • Identify potential LRAM project sites
- 9 • Ensure that biological considerations are part of the LRAM project prioritization process
- 10 • Determine the effectiveness of LRAM projects
- 11 • Work with the GIS component to create maps that depict the availability, suitability,
- 12 accessibility, and capacity of training lands
- 13 • Conduct internal encroachment assessments by routinely reviewing plans, such as the
- 14 INRMP, ICRMP, annual burn plan, and Endangered Species Management Plans

15 In particular, the use of rotation of training areas integrated with the RTLA program, and in  
16 combination with soil GIS maps developed for this EIS would be useful in correctly identifying  
17 areas in need of restoration and/or rest, and could be a good tool when determining appropriate  
18 locations for various intensities of training.

19 As allowable, training activities would be restricted or reduced by the Commander when the  
20 soils are saturated (e.g. after a rain or snow event) using the color code system to minimize  
21 impacts discussed in Section 2.5.2.2. These existing strategies would minimize the potential for  
22 soil erosion and sedimentation occurring from large-scale training activities or from individually  
23 minor, but collectively major, training activities.

24 Additionally, vehicles would be limited to existing routes and trails when IBCT training is  
25 conducted within dismounted maneuver areas to prevent damage to sensitive soils.

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## 3.6 Water Resources

### 3.6.1 Affected Environment

Water resources include surface waters (rivers, streams, lakes, and ponds), wetlands, floodplains, and groundwater. Surface water features and groundwater are typically interconnected via a system of recharge and discharge areas. Floodplains are closely related to surface waters, are the ultimate destination for precipitation and snowmelt on land, and the primary source of flood flows. Water resources at PCMS are managed in coordination with USGS, Natural Resources Conservation Service (NRCS), USFWS, Department of Justice, USACE, CPW, and the Colorado State Division of Water Resources (CDWR).

Fort Carson implements water resource management measures at PCMS including watershed and sedimentation monitoring, watershed and sedimentation management and enhancement, project reviews for erosion and sediment control, and compliance with Federal and state laws and regulations.

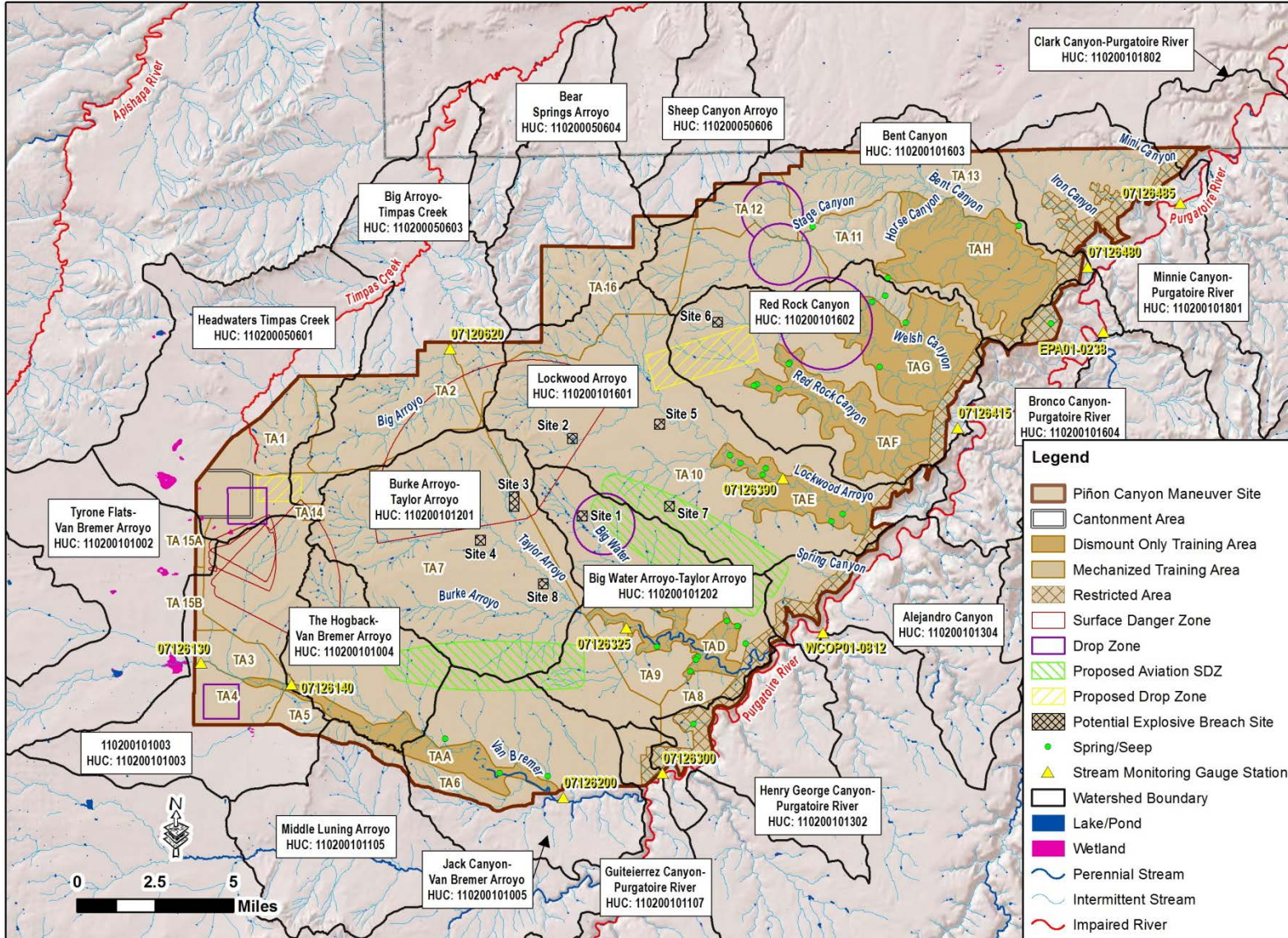
#### 3.6.1.1 Surface Water (Watersheds) and Floodplains

Surface water systems are typically defined in terms of watersheds. A watershed divides the landscape into hydrologically defined areas whose biotic and abiotic components function interactively. The watershed boundary more or less follows the drainage divide or the highest ridgeline around the stream channels, which meets at the bottom or lowest point of the land where water flows out of the watershed, commonly referred to as the mouth of the waterway. Any activity that affects water quality, quantity, or rate of movement at one location within a watershed has the potential to affect the characteristics of locations downstream.

A **watershed** is a land area bounded by topography that drains water to a common destination. Watersheds drain, capture, filter, and store water and determine its subsequent release.

PCMS is located in the Arkansas River basin. The Big Arroyo drainage system is located in the northwest region and flows into Timpas Creek, approximately three miles northwest of PCMS. The Purgatoire River and numerous ephemeral, intermittent, or perennial tributaries are also located within and adjacent to PCMS. The Purgatoire River, which flows in a northeasterly direction, is the primary drainage near PCMS and is a seventh-order tributary of the Arkansas River. The portion of the Purgatoire River that runs alongside PCMS is part of the segment from I-25 to the Arkansas River (see Figure 3.6-1). Elevation differences in the Purgatoire River basin cause climatic variations that affect stream flow. During years with average and above-average snowpack, such as 1984, 30 to 50 percent of the annual stream flow of the Purgatoire River occurs during April and May. During the rainfall-runoff period, May through October, flash floods occur intermittently. Releases from Trinidad Reservoir, located about 53 miles upstream from the stream flow gauging station on the Purgatoire River near Thatcher, affect stream flow on an intermittent basis (Fort Carson, 2013a).

EO 11988, *Floodplain Management*, instructs Federal agencies to consider the location of floodplains in the siting and development of projects. Typically, projects involving the placement of structures (i.e., buildings, berms, inadequately sized bridges) that have the potential to affect floodwater elevations or flows are discouraged. Currently, floodplain mapping for PCMS is not finalized, but Fort Carson is working with the USACE to develop a work plan to review, modify, and ultimately verify and validate the latest floodplain model (Fort Carson, 2013a).



Sources: USDA-NRCS, 2012; USDA-NRCS, 2013a; USFWS, 2014; Fort Carson, 2014a; USEPA, 2014a.

Figure 3.6-1. Water Resources at PCMS

### 3.6.1.2 Wetlands

Wetlands are transitional areas between upland and aquatic systems that are saturated with water or covered by shallow water at some time during the growing season. In addition, they support hydrophytic (water tolerant) vegetation and have a substrate of hydric soils (Cowardin et al., 1979).

The current estimate of wetlands on PCMS, based on the 2004 NWI, is 361 acres. Wetlands on PCMS are typically small and infrequent. Most wetlands on PCMS are associated with side canyons that are tributaries of the Purgatoire River, and water developments such as erosion control dams and other erosion control features (Fort Carson, 2013a).

Wetlands are protected under Section 404 of the CWA and EO 11900, *Protection of Wetlands*. In accordance with the CWA, disturbance to, or filling in, of potential wetlands at the installation are avoided to the greatest extent practicable, but if necessary, the USACE is consulted for jurisdictional determination and possible permitting for wetlands disturbance. Wetland management on PCMS consists of all elements related to compliance with the CWA, Section 404, as well as applicable EOs, Army regulations, and state laws. The wetlands management program adheres to provisions of the CWA to ensure protection from irresponsible and unregulated discharges of dredged or fill material that could permanently alter or destroy valuable water resources on PCMS. The goal of the wetlands management program is no net loss of wetlands on PCMS, which is in accordance with EO 11900, *Protection of Wetlands*, and the CWA (Fort Carson, 2013a).

The Fort Carson's INRMP has provisions to protect wetlands including details about permits (Regional General Permit, Nationwide Permit, and Individual Permits) and procedures for protecting wetlands (Fort Carson, 2013a). The Regional General Permit No. 14: *Fort Carson & PCMS Erosion Control Activities* was developed by Fort Carson and the USACE for standard erosion control work. This permit includes the construction and modification of erosion control dams, check dams, diversions, and other erosion control activities approved by USACE. Specific restrictions are identified in the permit, such as acreage limits per project, time limits for completion, and submission of quarterly reports (Fort Carson, 2013a).

### 3.6.1.3 Surface Water Quality

The CWA requires each state to develop a program to monitor, assess, and report on the quality of its waters. The CDPHE Water Quality Control Commission (WQCC) is responsible for establishing acceptable water quality levels on all streams in the state. WQCC divides all waterbodies in the state into segments, each of which has been assigned water quality levels, known as "water quality standards," that have been established to protect and preserve the beneficial uses of the water or to improve water quality.

As shown in Figure 3.6-1, the Purgatoire River is located directly east of PCMS and does not fall within the boundary of PCMS or in adjacent property to PCMS. The portion of the Purgatoire River that is located along the eastern boundary of PCMS is contained in stream Segment 7 of the Lower Arkansas River Basin. Stream Segment 7 is the mainstem of the Purgatoire River from I-25 to the confluence with the Arkansas River.

The Nationwide Rivers Inventory identified 117 miles of the Purgatoire River, part of which is located along the eastern boundary and downstream of PCMS, as having the potential to be considered for designation as a Wild and Scenic River for its outstanding scenic, geological, fish, wildlife, and cultural values. Although the identification of the river for study does not trigger protection under the Wild and Scenic Rivers Act of 1968, effective degradation avoidance and mitigation measures are used to control erosion and pollutants from leaving PCMS and entering the Purgatoire River.



1 CDPHE WQCC established state water quality standards including classifications and numeric  
2 standards listed in Regulation No. 32. Table 3.6-1 presents the established water quality  
3 standards for the mainstem and tributaries of the Purgatoire River at PCMS. Waterbodies can  
4 be assigned any of the five following categories of use classifications: aquatic life, recreation,  
5 water supply, wetlands, or agriculture. Stream Segment 7 of the Lower Arkansas River Basin,  
6 which contains the mainstem of the Purgatoire River and tributaries within PCMS, has been  
7 designated for the following uses: Aq Life Warm 1, Recreation E, and Agriculture (CDPHE,  
8 2013).

**Table 3.6-1. Stream Classifications and Water Quality Standards for Stream Segment 7  
(Purgatoire River)**

| Designation | Classification                                                                       | Physical and Biological Standards                      | Inorganic (mg/L) <sup>d</sup>                                                                                                             | Metals (µg/L) <sup>d</sup>                                                                                             |
|-------------|--------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| UP          | Aq Life Warm 1 <sup>a</sup><br>Recreation E <sup>b</sup><br>Agriculture <sup>c</sup> | DO = 5.0 mg/L<br>pH = 6.5 – 9.0<br>E.Coli – 126/100 mL | CL <sub>2</sub> (ac)=0.019<br>CL <sub>2</sub> (ch)=0.011<br>CN=0.005<br>S=0.002<br>B=0.75<br>NO <sub>2</sub> =0.5<br>NO <sub>3</sub> =100 | As(ac)=340<br>As(ch)=7.6(Trec)<br>CrIII(ch)=100<br>(Trec)<br>Fe(ch)=1000(Trec)<br>Hg(ch)=0.01(tot)<br>Mo(ch)=160(Trec) |

Source: CDPHE, 2013.

- a. Aq Life Warm 1 – Warm Water Aquatic Life: These are waters that (1) currently are capable of sustaining a wide variety of warm water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.
- b. Recreation Class E – Existing Primary Contact Use: These surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975.
- c. Agriculture: These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock.
- d. The following water quality constituents are derived using Table Value Standards (TVS): organic, ammonia (NH<sub>3</sub>) acute/chronic (ac/ch); and inorganic, cadmium (Cd [ac/ch]), trivalent chromium (CrIII [ac/ch]), hexavalent chromium (CrVI [ac/ch]), copper (Cu[ac/ch]), lead Pb [ac/ch], manganese (Mn [ac/ch]), nickel (Ni [ac/ch]), selenium (Se[ac/ch]), silver (Ag [ac/ch]), and zinc (Zn [ac/ch]). TVS are site-specific in-stream standards calculated using stream hardness. TVS equations use a stream hardness value calculated from the lower 95<sup>th</sup>-percent confidence limit of the mean hardness value at the periodic low-flow criteria determined from a regression analysis of site-specific data (5 CCR 1002).

As=arsenic; B=boron; Cl<sub>2</sub>=chlorine gas; CN=cyanide; DO=dissolved oxygen; Fe=iron; Hg=mercury; mg/L=milligrams per liter; ml=milliliters; NO<sub>2</sub>=nitrogen dioxide; NO<sub>3</sub>=nitrate; S=sulfur, tot=total; Trec=total recoverable; TVS=table value standard; µg/L=micrograms per liter; UP=use protected

9 Section 305(b) of the CWA requires states to assess and report the quality of their waterbodies.  
10 The CDPHE WQCC prepared an Integrated Water Quality Monitoring and Assessment Report,  
11 which was updated in 2012, pursuant to Sections 303(d) and 305(b) of the CWA. Section 303(d)  
12 of the CWA (33 USC 1313(d)) requires the State of Colorado to classify waters that do not meet  
13 designated water quality standards as "impaired" waterbodies. The CDPHE WQCC is required  
14 to present this information in a list to the USEPA for review and approval. This list is known as  
15 the "Section 303(d) List of Impaired Waters" (Fort Carson, 2013a). Stream segments that do not  
16 fully support their classified uses are defined as impaired and placed on the Section 303(d) List  
17 of Impaired Waters. The 2012 Section 303(d) List identified over 178 impaired waterbodies in

Colorado, with approximately 292 individual pollutants on those segments requiring the development of Total Maximum Daily Load (TMDL) (CDPHE, 2012).

As part of this listing process for impaired waterbodies, the CDPHE is required to prioritize waters/watersheds for future development of TMDL. Colorado and the Regional Water Quality Control Board have ongoing efforts to monitor and assess water quality, develop the Section 303(d) List, and develop TMDLs with associated priorities of High, Medium, or Low. Impaired waterbodies within and adjacent to PCMS are depicted in Figure 3.6-1 and detailed in Table 3.6-2. Fort Carson coordinates with the CDPHE to monitor and comply with regulations associated with impaired waters (Fort Carson, 2013a). A review of nearby watersheds indicated that the most prevalent impairment is due to selenium.

**Table 3.6-2. Impaired Waterbodies at or near PCMS**

| Waterbody Name                            | Impairment       | TMDL Status | Miles of Impairment On-Post |
|-------------------------------------------|------------------|-------------|-----------------------------|
| Purgatoire River (I-25 to Arkansas River) | Selenium         | TMDL Needed | 0                           |
| Timpas Creek                              | Selenium<br>Iron | TMDL Needed | 1.3                         |
| Apishapa River - Mainstem                 | Selenium         | TMDL Needed | 0                           |

Sources: USEPA, 2010a; USEPA, 2010b; USEPA, 2010c  
TMDL=Total Maximum Daily Load

High selenium levels have been observed in numerous locations throughout the state. The sources of selenium are typically tied to fossil fuels, such as coal or oil, or are the result of natural weathering or irrigation of Cretaceous marine shales and shale-derived soils. The region encompassing PCMS and Fort Carson has some of the highest naturally occurring, documented levels of selenium in the U.S. Naturally occurring selenium can create problems when land disturbances occur, such as those caused by military mechanized maneuvers and excessive erosion. Selenium that has leached into lower soil profiles over millions of years is exposed, and plants that act as selenium receivers then invade disturbed sites. Selenium can enter directly into aquatic systems when selenium-loaded soils are exposed to water. Soil runoff into waterbodies can often be attributed to erosion and soil disturbance that results from land disturbing activities such as maneuver training and agricultural activities. For instance, farming and grazing can reduce vegetative land cover and streambank stability, resulting in the potential for increased runoff of selenium-rich soils. Selenium can also be redistributed onto ground surfaces by deep-rooted, selenium receptor plants. Both aquatic and terrestrial wildlife can be acutely and chronically affected. No government standards/regulations exist for terrestrial and non-point source selenium. Upstream and downstream surface waters of PCMS do not have adequate monitoring data to provide a comparative basis of natural levels of selenium and potentially increased selenium levels from military training activities. Fort Carson's approach to managing selenium levels in surface waters is to reduce amounts of sediment entering streams through implementing sediment and erosion control measures and banksloping projects as necessary (Fort Carson, 2013a). Additionally, the 400 erosion control dams that are located throughout PCMS support selenium-reduction efforts.

### 3.6.1.3.1 Army Management

Under an Army-wide program, all ranges on Fort Carson and PCMS have been qualitatively evaluated for the presence, and possible migration pathways, of lead and other munitions constituents. None of the PCMS ranges show evidence of known releases or source-receptor interactions that could present an unacceptable risk to human health or the environment. Although lead migration is highly unlikely due to the existing environmental conditions at PCMS (i.e., arid environment), all ranges are reevaluated periodically. Also, standard operating procedures (SOPs) require that spill containment measures be put in place when temporary refueling points are set up downrange during training exercises. Drip pans are used, as needed, under every military vehicle while it is stationary (Fort Carson, 2013a).

Erosion is a natural process in the semi-arid region of Colorado. Gullies transport sediment during flash flood events. At PCMS, DPW and DPTMS are focused on minimizing accelerated erosion, which occurs above the natural level. More than 400 erosion control dams are located throughout the watersheds at PCMS to support minimization efforts. Erosion can be accelerated by construction and training activities that damage vegetation. When vegetation is removed, soil is exposed and more likely to be moved. This reduces the long-term ability of the training lands to support vegetation and the military mission (Fort Carson, 2013a).

### 3.6.1.3.2 Water Quality Monitoring

The USGS monitors a network of more than 70 erosion-control reservoirs (semi-annual or as needed site visits), a main-stem streamflow-gauging station on the Purgatoire River, and five seasonal, continuous-record, streamflow-sediment gauging stations on tributaries draining more than 60 percent of PCMS. Monitored erosion-control reservoirs are used in assessing sediment and streamflow yields from small watersheds within PCMS, and streamflow-sediment gauging stations are used to quantify streamflow and sediment outflows from PCMS. These sites continue to be monitored and/or operated by the USGS in support of erosion and sediment-production assessment of PCMS, subject to availability of funding from the Army (Fort Carson, 2013a).

Nine of the USGS monitoring stations are located in proximity to PCMS and provide a representation of PCMS water quality. Additional water quality data is available on the USEPA STORET (STORage and RETrieval) water quality database. Although the data is limited, two USEPA stream monitoring gauge stations are located on the Purgatoire River adjacent to PCMS (WCOP01-0812 and EPA01-0238). Table 3.6-3 presents the water quality monitoring stations within or near PCMS, which are also depicted in Figure 3.6-1.

**Table 3.6-3. Stream Monitoring Gauge Stations in Proximity to PCMS**

| Organization Name | Station ID | Stream                              | Location                            |
|-------------------|------------|-------------------------------------|-------------------------------------|
| USGS              | 07126130   | Van Bremer Arroyo, Purgatoire River | Van Bremer Arroyo near Thatcher, CO |
| USGS              | 07126140   | Van Bremer Arroyo, Purgatoire River | Van Bremer Arroyo near Thatcher, CO |
| USGS              | 07126200   | Van Bremer Arroyo, Purgatoire River | Van Bremer Arroyo near Model, CO    |
| USGS              | 07126300   | Purgatoire River                    | Purgatoire River near Thatcher, CO  |



**Table 3.6-3. Stream Monitoring Gauge Stations in Proximity to PCMS**

| Organization Name                                 | Station ID  | Stream                               | Location                                                               |
|---------------------------------------------------|-------------|--------------------------------------|------------------------------------------------------------------------|
| USGS                                              | 07126325    | Taylor Arroyo,<br>Purgatoire River   | Taylor Arroyo below Rock<br>Crossing near Thatcher, CO                 |
| USGS                                              | 07126390    | Lockwood Arroyo,<br>Purgatoire River | Lockwood Arroyo Canyon<br>Creek near Thatcher, CO                      |
| USGS                                              | 07126415    | Red Rock Arroyo,<br>Purgatoire River | Red Rock Arroyo at Mouth<br>near Thatcher, CO                          |
| USGS                                              | 07126480    | Bent Canyon Creek                    | Bent Canyon Creek at Mouth<br>near Timpas, CO                          |
| USGS                                              | 07126485    | Purgatoire River                     | Purgatoire River at Rock<br>Crossing near Timpas, CO                   |
| USEPA National<br>Aquatic Resource<br>Survey Data | EPA01-0238  | Purgatoire River                     | Purgatoire River<br>approximately two miles<br>upstream of Bent Canyon |
| USEPA National<br>Aquatic Resource<br>Survey Data | WCOP01-0812 | Purgatoire River                     | Purgatoire River Midway<br>between Taylor and Spring<br>Canyon         |

Sources: USEPA, 2014b; USGS 2014a.

Table 3.6-4 presents the available water quality data since 1999. The USGS stations (07126300 and 07126485) provide data through 2013, but there are many data gaps. Additionally, a query of the STORET database resulted in minimal data for the nearby stations. Communication with USGS Pueblo Office regarding the water quality monitoring stations along the Purgatoire River confirmed that the amount of water monitoring data is dictated by available resources from funding partners that changes from year to year (USGS, 2014b). Although the data is limited, it depicts large fluctuations in stream flow conditions. Stream flow fluctuations in the Purgatoire River can be attributed to precipitation, diversions, and irrigation-return flows.

Table 3.6-5 presents water quality data summarized by decade for the USGS stations in proximity to PCMS. The number of samples available for each monitoring station varies by decade and data parameter. Temperature data has remained relatively consistent through the decades. As previously mentioned, the data indicates fluctuations in stream flow and conductance, which is also noticeable through the decades and can be attributed to environmental factors such as precipitation. Near the southeast boundary of PCMS (07126300), stream flow in the Purgatoire River averaged 210 cubic feet per second (cfs) in the 1980s while the average was only 36 cfs in the 2000s. Meanwhile, at the northwest boundary of the installation (07126485), stream flow in the river averaged 265 cfs in the 1980s, 67 cfs in the 2000s, and 36 cfs in the 2010s. Although the water quality data is provided, due to data gaps throughout the years, it is considered insufficient to establish a baseline of water quality for the Purgatoire River near PCMS.

**Table 3.6-4. Water Quality Data for Stream Monitoring Stations near PCMS**

| Station ID                                        | 07126300 (Purgatoire River near Thatcher, CO) |     |       |       | 07126485 (Purgatoire River at Rock Crossing near Timpas, CO) |       |       |       | EPA01-0238 (Purgatoire River approximately two miles upstream of Bent Canyon) |     |     |       | WCOP01-0812 (Purgatoire River Midway between Taylor and Spring Canyon) |      |      |      |
|---------------------------------------------------|-----------------------------------------------|-----|-------|-------|--------------------------------------------------------------|-------|-------|-------|-------------------------------------------------------------------------------|-----|-----|-------|------------------------------------------------------------------------|------|------|------|
| Date Range                                        | 4/29/1999 – 11/5/2013                         |     |       |       | 3/2/1999 – 11/4/2013                                         |       |       |       | 8/25/2004                                                                     |     |     |       | 9/17/2002 – 8/13/2003                                                  |      |      |      |
| Statistics                                        | # of samples                                  | Min | Max   | Mean  | # of samples                                                 | Min   | Max   | Mean  | # of samples                                                                  | Min | Max | Mean  | # of samples                                                           | Min  | Max  | Mean |
| pH (SU)                                           | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 8.4   | 2                                                                      | 7.95 | 8.01 | 7.99 |
| DO (mg/L)                                         | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 7.3   | --                                                                     | --   | --   | --   |
| Temp (°C)                                         | 49                                            | 0.3 | 30    | 15    | 70                                                           | 0     | 28    | 17    | 1                                                                             | --  | --  | 23.5  | 2                                                                      | 20.9 | 28.3 | 24.6 |
| Spec. Cond. (µs/cm)                               | 29                                            | 901 | 4,730 | 2,769 | 35                                                           | 1,100 | 4,190 | 2,614 | 1                                                                             | --  | --  | 1,357 | 2                                                                      | 584  | 651  | 625  |
| Instantaneous Discharge (cfs)                     | 88                                            | 0.1 | 1,560 | 61    | 114                                                          | 0.14  | 2,300 | 107   | --                                                                            | --  | --  | --    | --                                                                     | --   | --   | --   |
| Turbidity (NTU)                                   | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 84.1  | 2                                                                      | 175  | 248  | 212  |
| TSS (mg/L)                                        | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 173   | 1                                                                      | 177  | 177  | 177  |
| Sus. Sediment (mg/L)                              | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | --                                                                            | --  | --  | --    | --                                                                     | --   | --   | --   |
| Sulfur (mg/L)                                     | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 63    | --                                                                     | --   | --   | --   |
| Dissolved Ammonia as N (mg/L)                     | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 0     | 2                                                                      | 0.01 | 0.03 | 0.02 |
| Dissolved Chloride (mg/L)                         | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 58.8  | 1                                                                      | --   | --   | 7.24 |
| Dissolved Magnesium (mg/L)                        | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 0.03  | 2                                                                      | 16.3 | 18.6 | 17.5 |
| Hardness as CaCO <sub>3</sub> (mg/L) <sup>a</sup> | --                                            | --  | --    | --    | --                                                           | --    | --    | --    | 1                                                                             | --  | --  | 263   | 1                                                                      | --   | --   | 72.3 |

**Table 3.6-4. Water Quality Data for Stream Monitoring Stations near PCMS**

| Station ID                | 07126300 (Purgatoire River near Thatcher, CO) |     |     |      | 07126485 (Purgatoire River at Rock Crossing near Timpas, CO) |     |     |      | EPA01-0238 (Purgatoire River approximately two miles upstream of Bent Canyon) |     |     |      | WCOP01-0812 (Purgatoire River Midway between Taylor and Spring Canyon) |     |      |      |
|---------------------------|-----------------------------------------------|-----|-----|------|--------------------------------------------------------------|-----|-----|------|-------------------------------------------------------------------------------|-----|-----|------|------------------------------------------------------------------------|-----|------|------|
| Date Range                | 4/29/1999 – 11/5/2013                         |     |     |      | 3/2/1999 – 11/4/2013                                         |     |     |      | 8/25/2004                                                                     |     |     |      | 9/17/2002 – 8/13/2003                                                  |     |      |      |
| Statistics                | # of samples                                  | Min | Max | Mean | # of samples                                                 | Min | Max | Mean | # of samples                                                                  | Min | Max | Mean | # of samples                                                           | Min | Max  | Mean |
| Dissolved Selenium (µg/L) | --                                            | --  | --  | --   | --                                                           | --  | --  | --   | 1                                                                             | --  | --  | 1.1  | 2                                                                      | 3.3 | 7.9  | 5.6  |
| Dissolved Zinc (µg/L)     | --                                            | --  | --  | --   | --                                                           | --  | --  | --   | 1                                                                             | --  | --  | 0    | 2                                                                      | 2   | 33.7 | 17.9 |

Sources: USEPA, 2014b; USGS 2014a.

a. Calculated from calcium and magnesium concentrations.

°C=degrees Celsius; CaCO<sub>3</sub>=calcium carbonate; cfs=cubic feet per second; mg/L=milligrams per liter; NTU=nephelometric turbidity unit; SU=standard unit

µg/L=micrograms per liter; µS/cm=microsiemens per centimeter

**Table 3.6-5. USGS Water Quality Data in Proximity to PCMS by Decade**

| Decade | 07126300 (Purgatoire River near Thatcher, CO) |      |                               |      |                              |       | 07126485 (Purgatoire River at Rock Crossing near Timpas, CO) |      |                               |      |                              |       |
|--------|-----------------------------------------------|------|-------------------------------|------|------------------------------|-------|--------------------------------------------------------------|------|-------------------------------|------|------------------------------|-------|
|        | Temperature (°C)                              |      | Instantaneous Discharge (cfs) |      | Specific Conductance (µS/cm) |       | Temperature (°C)                                             |      | Instantaneous Discharge (cfs) |      | Specific Conductance (µS/cm) |       |
|        | # of Samples                                  | Mean | # of Samples                  | Mean | # of Samples                 | Mean  | # of Samples                                                 | Mean | # of Samples                  | Mean | # of Samples                 | Mean  |
| 1980s  | 90                                            | 13   | 186                           | 210  | 47                           | 2,119 | 63                                                           | 17   | 191                           | 265  | 59                           | 2,178 |
| 1990s  | 30                                            | 14   | 103                           | 71   | 10                           | 2,432 | 95                                                           | 17   | 165                           | 145  | 76                           | 2,329 |
| 2000s  | 39                                            | 15   | 72                            | 36   | 19                           | 2,944 | 54                                                           | 17   | 86                            | 67   | 24                           | 2,721 |
| 2010s  | 4                                             | 12   | 11                            | 87   | 4                            | 2,563 | 3                                                            | 16   | 15                            | 36   | 3                            | 2,160 |

Source: USGS; 2014a.

°C=degrees Celsius; cfs=cubic feet per second; µS/cm=microsiemens per centimeter

Precipitation occurring at PCMS can vary greatly both yearly and seasonally. The precipitation is generally greatest in July and August (each averaging approximately 16 percent of the annual total) and least in December through February (each averaging approximately 3 percent of the annual total). Approximately 82 percent of the annual precipitation occurs between March and October. Approximately 25 percent of the annual precipitation falls during the spring months (March to May) and approximately 41 percent of annual precipitation falls during the summer months (June to August). Actual rainfall events are pulsed and vary greatly in duration and frequency from year-to-year. Both perennial and intermittent streams experience higher flows during periods of increased precipitation. Additionally, the available conductance data indicates large fluctuations. Conductance can be correlated with the amount of dissolved material in the water. High specific conductance indicates high dissolved-solids concentrations; dissolved solids can affect the suitability of water for domestic, industrial, and agricultural use.

A 1993 USGS study entitled *Assessment of Effects of Military Maneuvers on the Stream Flow, Water Quality, and Sediment Yields at PCMS, Las Animas County, Colorado* (USGS, 1993) analyzed the in stream water quality data during the pre- and post- military maneuver periods at PCMS from 1982 to 1985 and 1985 to 1987, respectively. Statistical analysis was used to determine the effects of military maneuvers on stream flow quantity and quality. The study indicated no statistically significant change in stream flow quantity or quality between the pre- and post-maneuver periods for the Purgatoire River and its tributaries within PCMS. Additionally, the study found that the largest correlation to sedimentation of the Purgatoire River is the number of large storm events received in the vicinity of PCMS, not the frequency of use of PCMS by the military.

A 2008 study (Stevens et al., 2008) produced similar results with regard to the correlation of sediment to large storm events. The study entitled *Temporal and Spatial Variations in Precipitation, Streamflow, Suspended-Sediment Loads and Yields, and Land-Condition Trend Analysis at the U.S. Piñon Canyon Maneuver Site, Las Animas County, Colorado, 1983 through 2007*, was conducted by the USGS in cooperation with the DA. The study assessed the spatial and temporal variations in precipitation, streamflow, suspended-sediment loads and yields, changes in land condition, effects of the tributaries on the Purgatoire River, and the possible relation of effects from military training to hydrology and land conditions that have occurred at PCMS from 1983 through 2007.

Data was collected and analyzed from most of the stations listed in Table 3.6-3. The data indicated that larger storms are generally bigger contributors to streamflow-runoff generation than military activity, although they occur less frequently. Additionally, larger and less frequent storms are more of a factor in sediment transport than smaller and more frequent storms. Streamflow from tributary watersheds to larger streams and rivers as a result of storm runoff can be an issue if the flow is excessive when compared to the flow in the receiving stream or river. Cumulative daily tributary streamflow indicated that the flow contribution from PCMS was generally small (i.e., only 3 percent of the time was the streamflow greater than 5 percent of daily streamflow at Purgatoire Rock Crossing Station, 07126485). In addition, the suspended-sediment load contribution from PCMS was minimal. The tributary watersheds at PCMS are 13.9 percent of the drainage area of station 07126485. Military training often involves active revegetation of soil damage and a higher density of erosion-control ponds, which could be contributing factors to the trend of smaller sediment yields in the southern tributaries.

Reduced sediment yields can also be attributed to the lack of agricultural grazing on PCMS. As discussed in Section 3.2, Land Use, agricultural grazing occurs on the land surrounding PCMS (i.e., within the Purgatoire watershed). High levels of agricultural grazing reduce vegetative land cover and can affect streambank stability. These effects can produce runoff and sedimentation, reducing water quality of nearby waterbodies. Since grazing is currently restricted on PCMS,

1 those areas of vegetation that are not under active restoration, or those areas not managed by  
2 controlled burn activities would likely be characterized by a higher density of vegetation, which  
3 can increase sediment trapping and reduce stormwater runoff.

4 The 2008 study also examined the correlation between land cover and sediment delivery. In  
5 general, both ground cover and bare-ground metrics decreased over time from 1989 through  
6 1999. This fact is counterintuitive since it would make sense for them to be inversely  
7 proportional (as ground cover increases, bare ground should decrease). Individual years of  
8 increased land disturbance, decreased ground cover, and increased bare-ground percentages,  
9 however, did not correlate well with individual years of large streamflow yields or suspended-  
10 sediment yields. The lack of correlation may be related to missing data for many of the years or  
11 it is possible that a longer study period is required to examine adequately the sediment delivery  
12 implications (Stevens et al., 2008).

13 Table 3.6-6 presents the available data from USGS stations 07126300 and 07126485 from the  
14 1993 study. These two stations were evaluated for various water quality parameters in addition  
15 to stream flow, suspended solids, and sediment loads. As indicated in the 1993 USGS report,  
16 the statistical data would be more reliable if additional years of stream flow quantity and quality  
17 data were evaluated, but existing water quality data after 1999 is extremely limited. Therefore,  
18 the 1993 report represents the most recent extensive water quality data set for the Purgatoire  
19 River near PCMS.

**Table 3.6-6. 1993 USGS Water Quality Data at Stations 07126300 and 07126485**

| Station ID                                                    | 07126300<br>(Purgatoire River near<br>Thatcher, CO) |       |         |       | 07126300<br>(Purgatoire River near<br>Thatcher, CO) |       |         |       | 07126485<br>(Purgatoire River at Rock<br>Crossing near Timpas, CO) |       |         |       | 07126485<br>(Purgatoire River at Rock<br>Crossing near Timpas, CO) |       |         |         |
|---------------------------------------------------------------|-----------------------------------------------------|-------|---------|-------|-----------------------------------------------------|-------|---------|-------|--------------------------------------------------------------------|-------|---------|-------|--------------------------------------------------------------------|-------|---------|---------|
|                                                               | Pre-maneuver (1982-1985)                            |       |         |       | Post-maneuver (1985-1987)                           |       |         |       | Pre-maneuver (1982-1985)                                           |       |         |       | Post-maneuver (1985-1987)                                          |       |         |         |
|                                                               | # of<br>samples                                     | Min   | Max     | Mean  | # of<br>samples                                     | Min   | Max     | Mean  | # of<br>samples                                                    | Min   | Max     | Mean  | # of<br>samples                                                    | Min   | Max     | Mean    |
| Spec. Cond.<br>( $\mu$ S/cm)                                  | 15                                                  | 1,320 | 3,440   | 2,440 | 25                                                  | 1,030 | 3,610   | 2,900 | 15                                                                 | 1,320 | 3,430   | 2,950 | 25                                                                 | 1,020 | 3,480   | 2,780   |
| Instantaneous<br>Stream Flow<br>(cfs)                         | 22                                                  | 14    | 1,090   | 52    | 22                                                  | 17    | 1,470   | 275   | 18                                                                 | 12    | 861     | 48    | 25                                                                 | 9.3   | 2,950   | 211     |
| DO (mg/L)                                                     | 16                                                  | 7.0   | 13.7    | 8.5   | 11                                                  | 7.2   | 12.2    | 10    | 16                                                                 | 5.9   | 13      | 8.0   | 9                                                                  | 5.6   | 11.4    | 8.6     |
| Dissolved<br>Nitrite plus<br>Nitrate as<br>Nitrogen<br>(mg/L) | 20                                                  | <0.10 | 0.76    | 0.18  | 22                                                  | <0.10 | 0.60    | 0.38  | 20                                                                 | <0.01 | 0.70    | 0.10  | 26                                                                 | <0.10 | 0.75    | 0.33    |
| Total<br>Recoverable<br>Cadmium<br>( $\mu$ g/L)               | 15                                                  | <0.1  | 4.0     | <0.1  | 10                                                  | <0.1  | 8.0     | <1.0  | 12                                                                 | <1.0  | 3.0     | <1.0  | 15                                                                 | <1.0  | 1.0     | <1.0    |
| Dissolved<br>Chromium<br>(mg/L)                               | 15                                                  | <10   | 20      | <10   | 10                                                  | <10   | <10     | <10   | 13                                                                 | <10   | 20      | <10   | 15                                                                 | <10   | 20      | <10     |
| Total<br>Recoverable<br>Copper ( $\mu$ g/L)                   | 15                                                  | 4.0   | 290     | 12    | 10                                                  | 2.0   | 930     | 20.5  | 12                                                                 | 2.0   | 430     | 11    | 15                                                                 | 2.0   | 510     | 130     |
| Total<br>Recoverable<br>Iron ( $\mu$ g/L)                     | 15                                                  | 160   | 180,000 | 1,200 | 9                                                   | 40    | 290,000 | 1,700 | 12                                                                 | 160   | 240,000 | 1,035 | 15                                                                 | 160   | 410,000 | 100,000 |
| Total<br>Recoverable<br>Lead ( $\mu$ g/L)                     | 15                                                  | <1.0  | 190     | 4.0   | 10                                                  | <1.0  | 600     | 9.0   | 12                                                                 | <1.0  | 270     | 4.0   | 15                                                                 | <1.0  | 400     | 6.0     |

**Table 3.6-6. 1993 USGS Water Quality Data at Stations 07126300 and 07126485**

| Station ID                         | 07126300<br>(Purgatoire River near<br>Thatcher, CO) |       |       |       | 07126300<br>(Purgatoire River near<br>Thatcher, CO) |       |        |       | 07126485<br>(Purgatoire River at Rock<br>Crossing near Timpas, CO) |       |       |       | 07126485<br>(Purgatoire River at Rock<br>Crossing near Timpas, CO) |       |       |       |
|------------------------------------|-----------------------------------------------------|-------|-------|-------|-----------------------------------------------------|-------|--------|-------|--------------------------------------------------------------------|-------|-------|-------|--------------------------------------------------------------------|-------|-------|-------|
|                                    | Pre-maneuver (1982-1985)                            |       |       |       | Post-maneuver (1985-1987)                           |       |        |       | Pre-maneuver (1982-1985)                                           |       |       |       | Post-maneuver (1985-1987)                                          |       |       |       |
|                                    | # of<br>samples                                     | Min   | Max   | Mean  | # of<br>samples                                     | Min   | Max    | Mean  | # of<br>samples                                                    | Min   | Max   | Mean  | # of<br>samples                                                    | Min   | Max   | Mean  |
| Total Recoverable Manganese (µg/L) | 15                                                  | 20    | 4,200 | 60    | 10                                                  | 30    | 11,000 | 275   | 12                                                                 | 30    | 6,400 | 70    | 15                                                                 | 40    | 9,800 | 2,800 |
| Total Recoverable Zinc (µg/L)      | 15                                                  | 10    | 810   | 40    | 9                                                   | 30    | 1,500  | 110   | 12                                                                 | 20    | 1,100 | 45    | 15                                                                 | 20    | 2,000 | 580   |
| Total Cyanide (µg/L)               | 12                                                  | <0.01 | <0.01 | <0.01 | 10                                                  | <0.01 | <0.05  | <0.01 | 11                                                                 | <0.01 | <0.01 | <0.01 | 15                                                                 | <0.01 | <0.05 | <0.01 |

Source: USGS, 1993.

cfs=cubic feet per second; µg/L=micrograms per liter; µS/cm=microsiemens per centimeter; mg/L=milligrams per liter



- 1 The 1993 USGS study also evaluated dissolved solids and sediment loads in relation to specific
- 2 conductance from water using data from years 1984 to 1987. Refer to Table 3.6-7 for a
- 3 summary of the dissolved solids and suspended sediment loads at Purgatoire River water
- 4 monitoring stations.

**Table 3.6-7. 1993 USGS Summary of Dissolved Solids and Suspended Sediment Loads in Proximity to PCMS**

| Station ID                                                      | Parameter                      | Year    |         |         |         |
|-----------------------------------------------------------------|--------------------------------|---------|---------|---------|---------|
|                                                                 |                                | 1984    | 1985    | 1986    | 1987    |
| 07126300<br>(Purgatoire River near Thatcher, CO)                | Dissolved Solids Load (tons)   | 119,000 | 110,000 | 118,000 | 155,000 |
|                                                                 | Suspended Sediment Load (tons) | 134,000 | 280,000 | 701,000 | 753,000 |
| 07126485<br>(Purgatoire River at Rock Crossing near Timpas, CO) | Dissolved Solids Load (tons)   | 113,000 | 106,000 | 116,000 | 150,000 |
|                                                                 | Suspended Sediment Load (tons) | 158,000 | 244,000 | 820,000 | 669,000 |

Source: USGS, 1993.

- 5 The 1993 USGS study evaluated the instream chemical properties and constituents to the water
- 6 quality standards using time-series plots. Table 3.6-8 presents the comparison of instream
- 7 water quality data to water quality standards. Exceedences were mostly attributed to naturally
- 8 occurring events such as farming and ranching activities along with periods of streamflow with
- 9 large concentrations of suspended sediment due to snowmelt and rainfall runoff.

**Table 3.6-8. 1993 USGS Study Instream Water Quality Data in Comparison to Water Quality Standards**

| Parameter                                         | 07126300<br>(Purgatoire River near Thatcher, CO) |                    | 07126485<br>(Purgatoire River at Rock Crossing near Timpas, CO) |                    |
|---------------------------------------------------|--------------------------------------------------|--------------------|-----------------------------------------------------------------|--------------------|
|                                                   | Samples                                          | Sample Exceedances | Samples                                                         | Sample Exceedances |
| Dissolved Oxygen (mg/L)                           | 27                                               | 0                  | 24                                                              | 0                  |
| Dissolved Nitrite Plus Nitrate as Nitrogen (mg/L) | 42                                               | 10                 | 46                                                              | 11                 |
| Total Recoverable Cadmium (µg/L)                  | 25                                               | 1                  | 27                                                              | 0                  |
| Dissolved Chromium (mg/L)                         | 25                                               | 0                  | 28                                                              | 0                  |
| Total Recoverable Copper (µg/L)                   | 25                                               | 14                 | 27                                                              | 19                 |
| Total Recoverable Iron (µg/L)                     | 24                                               | 12                 | 27                                                              | 16                 |
| Total Recoverable Lead (µg/L)                     | 25                                               | 8                  | 27                                                              | 6                  |
| Total Recoverable Manganese (µg/L)                | 25                                               | 8                  | 27                                                              | 10                 |
| Total Recoverable Zinc (µg/L)                     | 24                                               | 7                  | 26                                                              | 11                 |

Source: USGS, 1993.

mg/L=milligrams per liter; µg/L=micrograms per liter

#### 3.6.1.4 Groundwater and Aquifers

The surface geology at PCMS is predominantly sedimentary limestone, shale, and sandstone; basalt dikes occur along the southern boundary. The Dakota Sandstone and the Purgatoire Formation occur throughout a large part of the installation and are the principal source of groundwater in the area. Historically, groundwater was the predominant source of the area's water supply, which was obtained through a series of wells or springs for the usage of domestic or livestock water prior to the establishment of PCMS. Inspection of drillers' logs and on-site inspection during a well inventory indicated that most wells were completed in the Dakota-Purgatoire aquifer. Previous groundwater quality testing indicated that the groundwater beneath PCMS contains background concentrations of dissolved solids, sulfate, iron, manganese, nitrate, chloride, fluoride, selenium, and radionuclide constituents that exceed domestic or public-use water quality standards (Von Guerard, et al., 1987). These levels have been documented within the groundwater prior to the commencement of military maneuvers that began in July 1985 (Von Guerard, et al., 1987). The water quality is adequate for watering wildlife and livestock. Fort Carson purchases treated potable water for PCMS from the City of Trinidad for the cantonment area and for firefighting, storage tanks, and Soldiers in training areas. Trinidad's water supply consists of a variety of surface water supplies including diversions from creeks and the Purgatoire River, which are stored in reservoirs (RJH, 2012). Primary sources of groundwater on the installation are the Dakota Sandstone Formation and the Cheyenne Sandstone Member of the Purgatoire Formation (Fort Carson, 2013a).

In the northeastern parts of PCMS, groundwater generally moves northeast. Groundwater movement throughout the remainder of PCMS is toward the east and southeast. The aquifer recharges primarily from precipitation and subsurface inflow from adjoining areas. Where outcrop areas are traversed by ephemeral streams, occasional flood flows provide some local recharge of very limited areal extent. Wells in the Dakota-Purgatoire aquifer have reported yields that range from less than 10 to 500 gallons per minute. Well yield in unfractured parts of the Dakota-Purgatoire, which are known to occur at the installation, are likely to be less than 300 gallons per minute (Fort Carson, 2013a).

#### 3.6.2 Environmental Consequences

This section provides a discussion of the environmental impacts to water resources that would result from the No Action and Proposed Action alternatives. Impacts were primarily assessed by reviewing existing water resource conditions at PCMS and determining the potential effects of training and operations on nearby water resources. The extent of the water resource impacts would depend on the size and nature of the project and proximity to water resources, such as creeks, rivers, lakes, and wetlands. A significant impact to water resources would result from a detrimental change in surface water impairment status or an impairment to the use of groundwater aquifers. As discussed in Section 3.6.1.3, a TMDL for sediment has not been established for the Purgatoire River. Table 3.6-9 provides a comparison summary of the anticipated level of impacts.

**Table 3.6-9. Summary of Water Resources Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            | X     |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         |            |       | X        |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            |       | X        |             |            |
| Combined Elements <sup>a</sup>        |            |       |          | X           |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         |            |       | X        |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            |       | X        |             |            |
| Aviation Gunnery and Flare Training   |            | X     |          |             |            |
| Electronic Jamming Systems            | X          |       |          |             |            |
| Laser Targeting                       | X          |       |          |             |            |
| Demolitions Training                  |            | X     |          |             |            |
| UAS Training                          | X          |       |          |             |            |
| UGV Training                          | X          |       |          |             |            |
| Airspace Reclassification             | X          |       |          |             |            |
| DZ Development                        |            | X     |          |             |            |
| Combined Elements <sup>a</sup>        |            |       |          | X           |            |

a. Overall combined level of direct impact to water resources could be potentially significant. Although BCT training would be intermittent and short term in duration, increased training intensity and combined use by ABCT and SBCT units could affect site rotation and repair timeframes, which could increase sedimentation and levels of selenium to occur in nearby impaired waterbodies.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.6.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Under the No Action Alternative, there would be no changes to current training levels or installation operations as described in Section 2.2.1, Continue Existing Mission and Training Operations at PCMS. As shown in Section 2.5.3, Restoration and Rehabilitation of PCMS Training Lands, the most recent ABCT training exercise during wet conditions resulted in rutting and exposure of soils within 1,200 acres, which are currently being rehabilitated. As part of the restoration effort, and in coordination with the USACE, 5,480 cubic yards of earth were

excavated to install water bars. The goal of these sediment and erosion control devices is to aid in trail restoration by slowing the speed of flowing water runoff, and preventing exposed soil from moving until grass vegetation is firmly established.

Similar impacts to soils from training with tracked vehicles would continue. As stated in Section 3.6.1.3, Surface Water Quality, more than 400 erosion control dams are located throughout the watersheds at PCMS to aid in the minimization of erosion and sedimentation from training activities. The overall level of adverse impacts would be minor as these types of disturbances would continue to be mitigated through the RTLA and Land Rehabilitation and Maintenance (LRAM) efforts in order to maintain the long-term sustainability and availability of lands for military use (also refer to Section 4.2.4, Draft Historic Vegetation and Soil Impact Studies). Existing land and environmental management programs as described in Section 2.5.2, Protection of PCMS Resources, would continue. Impacts of current training to water resources would remain unchanged and Fort Carson would continue to implement its INRMP and ITAM program at PCMS to manage impacts to water resources.

### **3.6.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impact Measurement**

#### **3.6.2.2.1 ABCT, IBCT, and SBCT Training**

BCT training activities and the use of Stryker vehicles at PCMS as part of Alternative 1A, would result in areas of land disturbance following training events and the potential for sedimentation into adjacent waterways. Less intensive IBCT training would not likely cause more than minor adverse effects as these activities would be focused within dismount-only training areas and use of vehicles would be restricted to existing PCMS roadways and designated water crossings within the dismount-only training areas. The ABCT and SBCT training, which require larger training footprints and are more land-intensive due to the use of mechanized (heavy tracked and wheeled) vehicles, would generate more widespread areas of disturbance, which could result in sediment impairment to adjacent waterways. Individually, these events would likely result in moderate adverse impacts to surface water quality; however, depending on the intensity of ABCT and SBCT training, and the ability for the land to recover, the potential exists for significant adverse effects to surface water quality.

Direct impacts associated with operation of armored vehicles and heavy equipment for BCT training include degradation of stream channels and banks during training maneuvers, particularly when crossing dry drainages or training in wet conditions. Vehicles crossing dry drainages could modify drainage structures through erosion or compaction, resulting in increased erosion potential and indirect impacts to water quality. Since the Stryker vehicles are lighter, wheeled combat vehicles, Stryker vehicles would result in slightly reduced damage and impact to soils and water resources in comparison to heavy, tracked combat vehicles, such as Armor vehicles.

The ITAM program details low water crossings that are currently employed at PCMS and would continue to be used during maneuvers to reduce soil erosion and sedimentation. Potential surface water contamination could occur due to accidental spills of hazardous materials associated with vehicles and equipment (e.g., oil, fuels, and solvents). Fort Carson would continue to implement AR 200-1 and BMPs at PCMS to manage and reduce potential impacts. Additionally, FC Reg 200-1 includes stipulations for protection and conservation of wetlands and streams by following maps, posted signs, and water crossing requirements. FC Reg 350-4 further reinforces environmental protection by establishing training guidelines such as using existing roads and tank trails during maneuver training, crossing streams only at designated stream crossing sites, and avoiding designated no-drive and no-dig areas (i.e., spillways,

environmentally sensitive areas). Vehicles would be operated and maintained to minimize leaking fluids that could contaminate soils and waterbodies. Vehicle and equipment fueling and maintenance would be restricted to approved locations unless emergency field maintenance is required. If emergency maintenance is required, applicable control and containment measures would be implemented to prevent accidental contamination of surface water. Such controls include locating activities away from surface waters and stormwater inlets or conveyances, providing secondary containment (e.g., spill berms, decks, and spill containment pallets) and cover where applicable, and/or having spill kits readily available.

Armored vehicles and other heavy equipment used during BCT training would also disturb and expose soils due to soil compaction or loss of vegetation (refer to Section 3.5, Geology and Soils). Exposed soils would be more susceptible to erosion from stormwater runoff, which could indirectly impact surface waters through increased sedimentation and turbidity along with the potential to increase the amount of selenium. It is anticipated that existing erosion and sediment control measures, such as banksloping and the existing 400 erosion control dams across PCMS, would aid in controlling runoff and promote the settling and capture of sediments in runoff. Such measures would contribute to managing selenium within PCMS. If established stabilization and erosion control programs are not followed, an increase in naturally occurring selenium in nearby waterbodies could result in potentially significant impacts to the Purgatoire River and Timpas Creek since they are listed as impaired for selenium. Refer to Section 3.6.1.3 for a discussion of the CWA Section 303(d) List of Impaired Waters.

As discussed in Section 3.6.1.3, Surface Water Quality, the 1993 USGS study reported no statistically significant change in stream flow quality and quantity between the pre- and post-maneuver periods for the Purgatoire River and its tributaries within PCMS. Fort Carson management tools for preventing and reducing potential impacts include proper implementation of existing programs, plans, and monitoring actions, which would also be applied under the Proposed Action Alternative. The existing INRMP requirements and ITAM program along with erosion and sediment control programs would be used to reduce erosion and sedimentation impacts to waterbodies on and surrounding PCMS. Programs include bank sloping of eroded gullies, hardening of crossings, terraces, revegetation, and construction of erosion control dams. Training lands are monitored on a routine basis as part of the ITAM program to identify locations requiring site stabilization and sediment control improvements.

Training intensity (i.e., increased Soldier and equipment density per BCT-level events) would add stress to soil resources and increase the potential soil degradation and increased erosion and sedimentation into nearby surface waters. As described in Section 2.2.2.2, however, the Army would establish a BCT-level training intensity limit using SMAs and Total Task Miles to complement the 4.7-month brigade-level training period duration. This approach would allow the Army to manage brigade-level training periods using intensity and duration metrics, rather than just duration alone, and provide the Army with an additional measure regarding intensity of BCT training to manage training lands. The use of an additional metric to gauge training land sustainability would be an overall benefit to water resources as the Army would cease brigade-level training when either the duration or intensity metric, whichever comes first, is attained during a training year.

The PCMS Stormwater Pollution Prevention Plan (SWPPP) and SWMP would need to be updated to reflect the change in training. Overall impacts to stormwater would be negligible. Since the Alternative 1A does not involve any new structures or facilities, stormwater would be managed through the natural setting of creeks and valleys.

### 3.6.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS

#### 3.6.2.3.1 ABCT, IBCT, and SBCT Training

Section 3.6.2.2 discusses the potential for impacts regarding proposed BCT training activities. As analyzed within Alternative 1A, brigade maneuver training would result in individually minor to moderate impacts to water resources, and potentially significant combined impacts from BCT training activities. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts to water resources from readiness training using new tactics and equipment are discussed below.

#### 3.6.2.3.2 Aviation Gunnery (non-explosive) and Flare Training

Aviation gunnery training would take place in Range 9 and the two proposed new SDZs. Table 3.6-10 presents the acreages of lakes and wetlands and the miles of streams within the areas proposed for aviation gunnery training. Freshwater emergent wetlands are the primary type of wetlands within Range 9 and the only type within the proposed two new SDZs.

**Table 3.6-10. Water Resources within Aviation Gunnery Training Areas**

| Location             | Streams (miles) |           | Lakes (acres) | Wetlands (acres) <sup>a</sup> |
|----------------------|-----------------|-----------|---------------|-------------------------------|
|                      | Intermittent    | Ephemeral |               |                               |
| Range 9              | 65.4            | 0         | 37.8          | 30.5                          |
| Training Area 7 SDZ  | 14.3            | 0         | 11.1          | 8.0                           |
| Training Area 10 SDZ | 9.4             | 2.0       | 7.7           | 5.5                           |

Sources: USDA, 2014; USFWS, 2014.

a. Wetlands data presented is NWI wetlands mapping and not field-delineated.

SDZ=surface danger zone

The temporary targets used for aviation gunnery training would be located to avoid water resources such as wetlands and other waterbodies, reducing the potential for direct impacts.

Firing non-explosive rockets or ballistics from air to ground would disturb the soils at and surrounding the temporary targets when the munition makes contact with the ground. The resulting exposed and disturbed soils would be more susceptible to erosion from stormwater runoff, which could result in potentially minor impacts to water quality due to increased sedimentation and turbidity to receiving waterbodies.

Flare training would involve the use of flares, which contain metals such as magnesium pellets. As discussed in Section 2.2.3.1, the flares are designed to burn out before reaching the ground and would be dispatched at 1,500 feet AGL or greater so no direct adverse impacts to water resources are anticipated.

#### 3.6.2.3.3 Electronic Jamming Systems

The use of electronic jamming systems and the associated training would have no direct adverse impacts to water resources since no ground disturbing activities would occur. Indirect impacts would result from transport of Soldiers and equipment during training activities. The vehicles and equipment could disturb soil surfaces, particularly if land outside of trail roads is used, or if there are spills of vehicular fluids. These indirect impacts are anticipated to be

avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

#### 3.6.2.3.4 Laser Targeting

Laser targeting training would have no direct adverse impacts to water resources since no ground disturbing activities would occur. Indirect impacts would result from transport of Soldiers and the equipment employed with the laser targeting systems (i.e., Shadows, AH-64s, handheld and vehicular systems). The vehicles and equipment could disturb soil surfaces, particularly if land outside of trail roads is used, or if there are spills of vehicular fluids. These indirect impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

#### 3.6.2.3.5 Demolitions Training

Demolitions training would result in minor adverse impacts to water resources. Demolition activities would locally disturb soils at and adjacent to the point of detonation. Disturbed and exposed soils are more susceptible to erosion from stormwater runoff, which could result in increased sedimentation and turbidity to receiving waterbodies. Demolitions activities would be confined within eight designated breach sites. Table 3.6-11 presents the water resources within the proposed breach sites.

**Table 3.6-11. Water Resources within Proposed Breach Sites**

| Location | Streams (miles) <sup>a</sup> | Lakes (acres) <sup>b</sup> | Wetlands (acres) <sup>c,d</sup> |
|----------|------------------------------|----------------------------|---------------------------------|
| Site 1   | 0.3                          | 1.1                        | <0.1                            |
| Site 2   | 0.6                          | 0.5                        | 0.4                             |
| Site 3   | 0.4                          | --                         | --                              |
| Site 4   | --                           | --                         | --                              |
| Site 5   | --                           | --                         | --                              |
| Site 6   | 0.3                          | --                         | --                              |
| Site 7   | --                           | --                         | --                              |
| Site 8   | 0.3                          | --                         | --                              |

Sources: USDA, 2014; USFWS, 2014.

a. All streams are intermittent.

b. All lakes are perennial.

c. All wetlands are freshwater emergent.

d. Wetlands data presented is NWI wetlands mapping and not field-delineated.

Although over half of the proposed breach sites contain water features, detonation activity is not anticipated to impact water resources directly. The detonation points would be located away from the waterbodies to preserve their integrity and channel morphology. Additionally, established stabilization and erosion control programs would be used, in conjunction with the existing INRMP and ITAM program, to manage and reduce erosion and sedimentation impacts to waterbodies on and surrounding PCMS.

During demolitions training, Soldiers could traverse the waterbodies on foot and use the depressions for concealment during detonation. Such activities could result in negligible impacts

to streambanks and waterbodies, in addition to soils within the proposed breach sites. Additional indirect impacts would occur due to transport of Soldiers and equipment, which could disturb soil surfaces and potentially cause sedimentation to nearby waterbodies. To minimize off-road disturbances from equipment such as vehicles, the proposed breach sites would be located adjacent to existing trails. These impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

The use of explosive materials could contaminate soils and waters within the blast zone. Section 3.13, Hazardous Materials, Hazardous Waste, and Toxic Substances, discusses the constituents of explosives and the potential for residue contamination and accumulation into the soils. As the majority of the by-products dissipates or evaporates in the open air (99.997 percent), the potential for accumulation of contaminants to adversely impact water resources is unlikely.

#### **3.6.2.3.6 UAS Training**

UAS training would have no direct adverse impacts to water resources since no ground disturbing activities would occur. Indirect impacts would result from the transport of Soldiers and equipment during training activities. The vehicles and equipment could disturb soil surfaces, particularly if land outside of trail roads is used, or if there are spills of vehicular fluids. These indirect impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

#### **3.6.2.3.7 UGV Training**

UGV training would have negligible direct impacts to water resources. Since the UGV equipment is less than 500 pounds, minimal soil disturbance would occur due to operation of the UGV. Indirect impacts would result from transport of Soldiers and equipment during training activities. The vehicles and equipment could disturb soil surfaces, particularly if land outside of trail roads are used, or result in spills of vehicular fluids. These indirect impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

#### **3.6.2.3.8 Airspace Reclassification**

The reclassification of airspace would have no direct or indirect adverse impacts to water resources. No ground disturbing activities would occur that would have the potential to directly or indirectly adversely impact water resources.

#### **3.6.2.3.9 DZ Development**

Table 3.6-12 presents the water resources within the two proposed new DZs at PCMS. Since it is anticipated that only potential hazards (i.e., small stakes, vertical hazards) would be removed within the proposed DZ, minimal removal of woody vegetation would be required. If vegetation removal is required, BMPs (e.g., silt fences) would be used to minimize the transport of sediments.



**Table 3.6-12. Water Resources within the Proposed DZs<sup>a</sup>**

| DZ Location | Streams (miles) | Lakes (acres) | Wetlands (acres) |
|-------------|-----------------|---------------|------------------|
| Jake        | 4.9             | 1.9           | 1.0              |
| Sammy       | 0.2             | 0             | 0                |

Sources: USDA, 2014; USFWS, 2014.

a. Streams and lakes presented are intermittent.

DZ=drop zone

Drop activities would avoid water resources to the extent practicable but the exact landing spot is dependent on uncontrollable environmental factors such as wind. Drop activities include heavy materials that could locally disturb soils, streambeds, and water features. Soil disturbance could include soil compaction and erosion. Exposed soils are more susceptible to erosion from stormwater runoff, which could result in increased sedimentation and turbidity to receiving waterbodies resulting in the potential for minor impacts. As detailed in Section 3.6.2.2.1, ABCT, IBCT, and SBCT Training, the existing INRMP requirements and ITAM program along with erosion and sediment control programs would be used to reduce erosion and sedimentation impacts to waterbodies on and surrounding PCMS.

Indirect impacts would result from transport of Soldiers and equipment during drop activities. The vehicles and equipment could disturb soil surfaces, particularly if land outside of trail roads is used, or if there are spills of vehicular fluids. These indirect impacts are anticipated to be avoided through equipment maintenance, spill management, and use of the existing trail network to the greatest extent practicable.

### 3.6.3 Mitigation Measures

Potentially significant adverse impacts to water resources caused by combined effects of BCT training at PCMS, including degradation of existing soils and the resulting erosion and runoff, could be reduced to less-than-significant. Enhanced application of existing land management programs, training land rotation, and continued RTLA and LRAM efforts (as discussed in Section 2.5, Existing PCMS Training Protocol and Range Management, and Section 3.5.1.2.3, Fort Carson Management Factors Affecting PCMS Soils) would be necessary to offset training impacts to water resources from sedimentation.

Methods of achieving this goal could include intensive habitat restoration activities (e.g., stabilizing soils, native reseeding, etc.), timing and rotating the locations of off-road vehicle use to allow proper restoration to succeed, and limiting activities to highly localized areas. Through procedures already in place and enforced at PCMS, the installation currently conducts such activities.

Fort Carson would continue to evaluate the type, extent, and location of training damage. To the extent practicable, funding would be secured prior to training to ensure that damaged training lands are adequately repaired according to the ITAM program and FC Reg 350-10. Restoration activities would be monitored for effectiveness, and would be modified to best suit the needs of the installation, the affected water resources, and the form of training that caused the impact. Fort Carson would continue to evaluate the successes of mitigation efforts (including streambank stabilization and runoff/sedimentation control) and modify future efforts, if needed, to reach and sustain water resources management objectives while maintaining land sustainability for the training mission. This would be used to identify methods and locations to prevent or repair sedimentation runoff, including selenium, into adjacent surface waters.

1 Training activities could be restricted or reduced by the Commander when the soils are  
2 saturated (e.g., after a rain or snow event) to minimize soil rutting and erosion and indirect  
3 effects of sedimentation into adjacent surface waters. The Commander would consider a variety  
4 of training factors that are specified in FC Reg 350-4, such as training schedules, necessity of  
5 training, and upcoming operational missions (see Section 2.5.2.2). These strategies would  
6 minimize the potential for adverse indirect impacts from large-scale training activities or from  
7 individually minor, but collectively significant, training activities within the Purgatoire River  
8 watershed.

## 3.7 Biological Resources

### 3.7.1 Affected Environment

#### 3.7.1.1 Vegetation

PCMS is approximately 235,000 acres and is located within the Central Shortgrass Prairie ecoregion. This region is 56 million acres and encompasses all the plains of Colorado (east of the Rocky Mountains) as well as portions of Wyoming, Nebraska, Kansas, Oklahoma, Texas, and New Mexico. The Central Shortgrass Prairie is characterized by rolling-to-undulating plains and tablelands of low relief. These features are traversed by streams and contain canyons, buttes, badlands, and isolated mountains. Shortgrass prairie, mixed-grass prairie, and sand-sage prairie community types dominate the Central Shortgrass Prairie ecoregion (Fort Carson, 2013a).

Approximately 91 percent of PCMS supports vegetation; the remaining 9 percent is covered only by limited vegetation (i.e., developed or rocky areas), as shown in Figure 3.7-1. The locations of general vegetation communities found within PCMS include the following (Fort Carson, 2011c; Fort Carson, 2013a):

- Shortgrass prairie grasslands comprise approximately 41 percent of PCMS. Major grass species include blue grama (*Andropogon gerardii*), western wheatgrass (*Pascopyrum smithii*), galleta (*Hilaria jamesii*), sideoats grama (*Bouteloua curtipendula*), dropseeds (*Sporobolus* spp.), buffalograss (*Buchloe dactyloides*), little bluestem (*Schizachyrium scoparium*) and needle and thread grass (*Hesperostipa comata*). Various shrubs scattered throughout the grasslands include prickly pear and cholla cacti (*Optunia* spp.), yucca (*Yucca glauca*), four-winged saltbush (*Atriplex canescens*), rabbitbrush (*Chrysothamnus nauseosus*) and skunkbush sumac (*Rhus trilobata*).
- Shrublands, which typically contain a grass understory, comprise approximately 33 percent of PCMS. Deciduous shrubland, with species including Gambel oak (*Quercus gambelii*), salt cedar (*Tamarix* spp.) and willow (*Salix* spp.), is found along major drainages.
- Forests and woodlands constitute approximately 17 percent of PCMS. Ponderosa pine (*Pinus ponderosa*), piñon pine (*P. edulis*) and one-seed juniper (*Juniperus monosperma*) are the dominant species of higher elevation woodlands on rocky and steeper slopes; cottonwood (*Populus* spp.), and willow (*Salix* spp.) dominate woodlands near or along drainages. Altogether, three distinct forest communities exist within PCMS. These forest communities are discussed below, in descending order of acres covered.
  - Piñon-juniper communities encompass 39,928 acres (16,158 hectares) of PCMS and include savannas and woodlands generally occurring at elevations between 1,860 and 5,576 feet (567 and 1,700 meters) above MSL. Piñon pine and one-seeded juniper are common, with juniper dominating. The understory is dominated by grass, forbs, and occasional shrubs. While piñon-juniper communities have continued to expand and encroach into new areas due to fire suppression and grazing, persistent piñon-juniper often occur on soils that are thin and rocky and where topographic conditions protect the stands from frequent fires. Piñon-juniper communities provide important year-round habitat for wildlife. Mature piñon-juniper stands are particularly important for bird species, which rely on habitat features provided by mature stands, such as large-diameter trunks for nest cavities and roost holes, branches for nesting and perching and food resources from berries, seeds and insects. Deer and elk use these stands for primary and winter range.

- Ponderosa pine forests occupy approximately 33 acres of PCMS, primarily along canyon bottoms and rims. These communities are comprised of ponderosa pine, Gambel oak, juniper and piñon pine. Ponderosa pine forests are used by a variety of wildlife including numerous birds, small mammals, elk and deer. Gambel oak is particularly important to many wildlife species for cover, nesting, and food.
- Cottonwood-willow riparian communities are found along ephemeral and intermittent streams with vegetation predominantly composed of deciduous species. Common species include narrowleaf cottonwood (*Populus angustifolia*), plains cottonwood (*P. deltoides*), Gambel oak, and white willow (*Salix alba*). Non-native tamarisks (*Tamarix ramosissima*) are also found in these communities. Riparian communities at PCMS occur in the low canyon areas and have restricted access.

Designed to serve as a spatial framework for research assessment and monitoring of ecosystems and ecosystem components, ecoregions denote areas within which lands, aquatic areas, vegetation communities, and habitats (and the type, quality and quantity of environmental resources) are generally similar. For the purposes of this EIS, Omernik's ecoregion classifications are used. This hierarchical system, also used by the USEPA, identifies distinct ecoregions on the basis of "the spatial patterns of both the living and non-living components of the region, such as geology, physiography, vegetation, climate, soils, land use, wildlife, water quality and hydrology" (National Atlas of the United States, 2013). Different levels have been developed to describe ecoregions at varying scales. A Roman numeral classification scheme distinguishes between these levels. Level I is the broadest level, dividing North America into 15 ecological regions; Level II divides the continent into 50 levels; and Level III divides the continent into 85 levels. For most of the U.S., the ecoregions have been further subdivided to Level IV, which includes hundreds of levels. Per this system of ecoregion designation, PCMS occurs within the Southwestern Tablelands Level III ecoregion and the Piedmont Plains and Tablelands Level IV ecoregion (Chapman et al., 2006).

The Southwestern Tablelands flank the High Plains with red-hued canyons, mesas, badlands and dissected river breaks. Unlike most adjacent Great Plains ecological regions, little of the Southwestern Tablelands is in cropland. Most of this region is in sub-humid grassland and semiarid rangeland. The boundary to the east in Colorado represents a transition from the more extensive cropland within the High Plains to the generally more rugged and less arable land within the Southwestern Tablelands ecoregion. The natural vegetation in the Colorado portion of this region is mostly grama-buffalograss, with some juniper-scrub oak-grass savanna on escarpment bluffs.

The Piedmont Plains and Tablelands ecoregion is a vast area of irregular and dissected plains underlain by shale and sandstone. Precipitation varies from 10 to 16 inches, with the lowest amounts found along the Arkansas River between Pueblo and Las Animas. The shortgrass prairie contains buffalograss, blue grama, western wheatgrass, galleta, alkali sacaton (*Sporobolus airoides*), sand dropseed (*Sporobolus cryptandrus*), sideoats grama, and yucca. Land use is mostly rangeland. Irrigated agriculture occurs along the Arkansas River and dryland farming is found primarily in the northern half of the region.

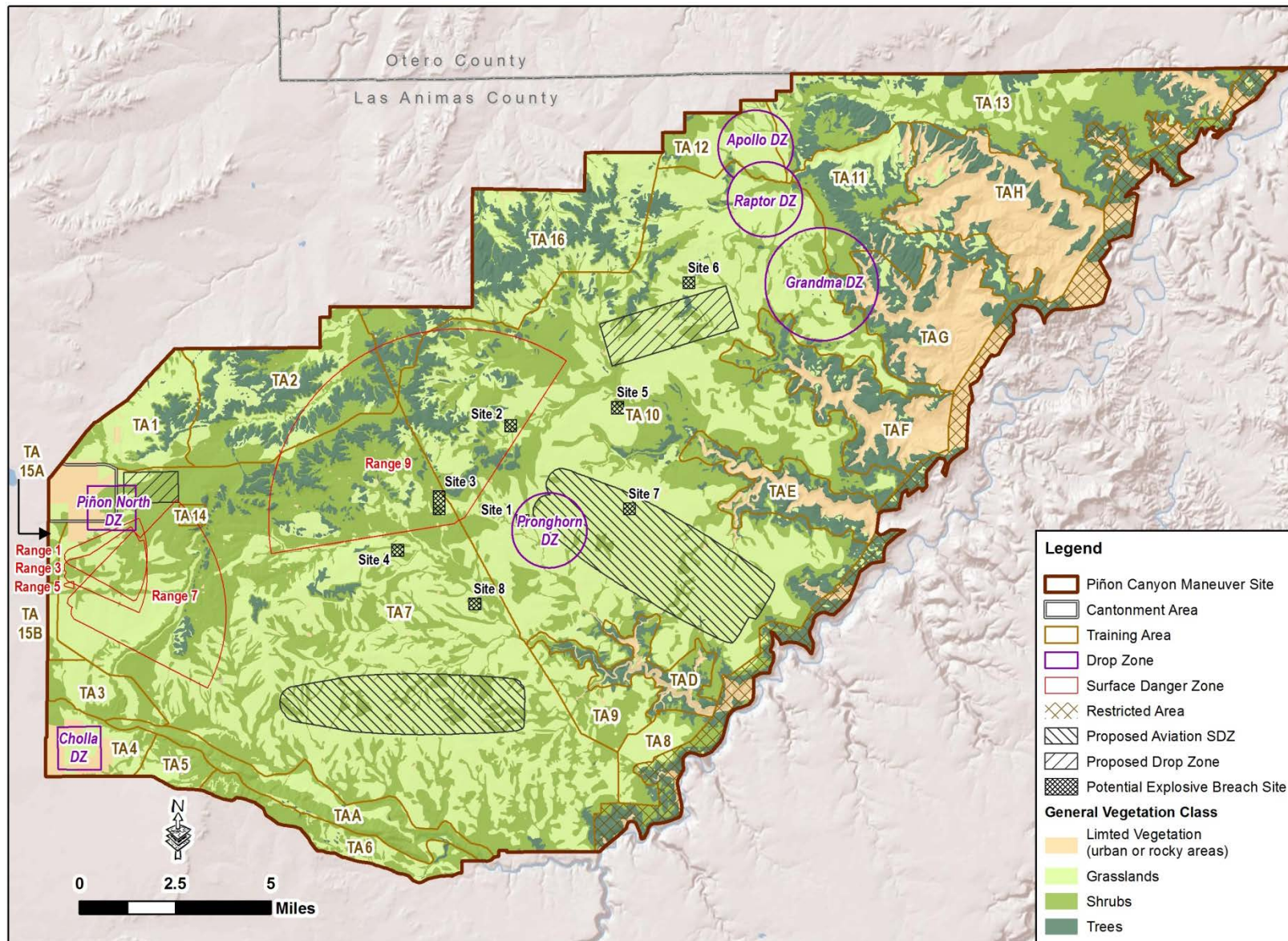


Figure 3.7-1. General Vegetation Communities at PCMS



### 3.7.1.2 Wildlife and Aquatic Life

Wildlife habitats on PCMS are diverse and cover large tracts of relatively undeveloped land. Maintaining wildlife habitats within an active training installation is not completely incompatible with the military mission, but does require active management.

#### 3.7.1.2.1 Mammals

Onsite surveys have identified a total of 56 mammal species within PCMS, including 47 species of small mammals (Fort Carson, 2013a). Large mammal species include mountain lion (*Puma concolor*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), black bear (*Ursus americanus*), elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), pronghorn (*Antilocapra americana*), and bighorn sheep (*Ovis canadensis*).

Big game populations are managed by seasonal hunting to attain population and sex ratio targets set by the Colorado Parks and Wildlife. Archery, muzzleloading, and rifle seasons begin in late August and end in January. The major big game seasons, in terms of the number of participants, are deer, elk, and pronghorn. Turkey (*Meleagris gallopavo*), dove (*Zenaida macroura*), coyote, bobcat and rabbit (*Sylvilagus* spp.) are the important small game seasons (Fort Carson, 2013a). See Section 3.2, Land Use, for additional details regarding hunting within PCMS.

#### 3.7.1.3 Protected Species

No Federally listed, Federal candidate, Federally proposed, or Federally petitioned species, nor any critical habitat for any species, are known to occur within PCMS. The New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) is not known to occur within PCMS nor does any suitable habitat. USFWS has determined that critical habitat for the New Mexico meadow jumping mouse is more than 20 miles away from PCMS.

The only state-listed species, the state-threatened burrowing owl (*Athene cunicularia*), occurs on PCMS, which can occupy up to 85 percent of their available suitable habitat (active prairie dog colonies). While not protected by the Federal Endangered Species Act, this species is protected by the Migratory Bird Treaty Act (MBTA) and state regulations. The burrowing owl inhabits abandoned burrows within active prairie dog colonies during the nesting season and is generally present on PCMS from March through October (i.e., the period between nest building and when the young fledge). Current installation guidelines in the INRMP restrict significant natural resource management actions (e.g., prescribed fire and seeding) to only be conducted during the non-breeding season (typically 1 April through 15 August) (Fort Carson, 2013a).

Army Species at Risk (SARs) are species that can significantly impact the Army training mission if listed as threatened or endangered. The objective of the Army SAR initiative is to conserve species prior to Federal listing under the Endangered Species Act. These species are currently protected by state or Federal regulations. In order to minimize the possibility of future listing or candidate status, there is a section of FC Reg 200-6, *Wildlife Management and Recreation*, that prohibits recreationists from collecting these species. Training restrictions are not warranted at this time to protect populations of Army SARs on PCMS. On PCMS, SAR species include one species of reptile and three plant species (Fort Carson, 2013a):

- Triploid checkered whiptail (*Aspidoscelis neotesselata*; formerly *Cnemidophorus neotesselatus*) – this all-female reptile species is a hybrid species with three complete sets of chromosomes that reproduces parthenogenetically, meaning that no fertilization of the embryo occurs. This species originated through hybridization between a female *C. tigris marmoratus* (*C. marmoratus*) and a male *C. septemvittatus* (*C. gularis septemvittatus*), followed by hybridization between one of these hybrids with a male *C.*

*sexlineatus*. Suitable habitat occurs in southeastern Colorado, including the foothills of the Rocky Mountains in Fremont, Pueblo, Otero and Las Animas counties up to elevations of 6,900 feet above MSL. Habitat includes hillsides, arroyos, and canyons associated with the Arkansas River Valley; the canyon-grassland transition along the Huerfano River; grassland-surrounded arroyo habitat along tributaries of the Apishapa River; and roadsides, shrubby areas and juniper-grass associations in valleys, arroyos and canyons associated with the Purgatoire River and some of its tributaries. In addition to being an Army SAR, the triploid checkered whiptail is currently a species of state special concern (CDOW, 2013b).

- Dwarf milkweed (*Asclepias uncialis*; also known as wheel milkweed) – this species occupies a range located primarily in the Central and Southern Shortgrass Prairie ecoregions and is primarily associated with shortgrass prairie, other grassland, or open coniferous communities. Associated species may include buffalograss, needle and thread grass, prairie junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), purple threeawn (*Aristida purpurea*), sand dropseed (*Sporobolus cryptandrus*), sand sagebrush (*Artemisia filifolia*), big sagebrush (*A. tridentata*) and rabbitbrush. Its typical habitat includes level to gently sloping terrain. Dwarf milkweed may be found at the base of escarpments or mesas, but not on rock ledges, outcroppings, or highly disturbed habitats. Known populations are found at elevations ranging from approximately 3,920 to 7,640 feet above MSL (Decker, 2006). This species has approximately 35 extant occurrences in 14 counties across Colorado (Neid and Handwerk, 2007).
- Arkansas feverfew (*Bolophyta tetraeneuris*; also known as *Parthenium tetraeneuris*) – this species inhabits barren, light-colored shale and limestone benches and knolls. Arkansas feverfew occurs at elevations between approximately 5,400 and 5,750 feet above MSL and is usually associated with piñon-juniper woodlands. This species is currently known from approximately 30 extant occurrences in six Colorado counties (Neid and Handwerk, 2007; NatureServe Explorer, 2013).
- Roundleaf four o'clock (*Oxybaphus rotundifolius*; also known as *Mirabilis rotundifolia*) – habitat for this species is restricted to shale barren habitat at elevations between 4,800 and 5,600 feet above MSL. Among shale barrens species, roundleaf four o'clock is relatively more susceptible to severe disturbance; it does not tend to occur on road cuts though it is known from areas adjacent to roads that were not impacted by their construction (Neid and Handwerk, 2007). This species is typically found within sparse shrubland or woodland and is associated with James' seaheath and oneseed (NatureServe Explorer, 2013).

#### 3.7.1.4 Fort Carson Natural Resources Management (including PCMS)

##### 3.7.1.4.1 Ecosystem Adaptive Management

The purpose of natural resources management at Fort Carson, to include PCMS, is to maintain high-quality lands for training, biodiversity, and recreation (see Section 3.2 regarding the Sikes Act). Terrestrial habitat management activities are directed towards maintenance of healthy ecosystems and facilitation of sustainable military training on Fort Carson and PCMS.

To facilitate this effort, Fort Carson uses an adaptive ecosystem management strategy to protect, conserve, enhance, and monitor resources and to adjust INRMP management objectives based upon the effects of training activities. Management decisions are made on the basis of the best available science and attempt, where practical, to mimic the natural historical disturbance regimes for the ecoregion. Ecosystem management is an evolving management

scheme. As new information and ideas are gleaned from current research, Fort Carson's resource management will change to reflect the best information available. Monitoring programs indicate whether management measures and strategies are effective in achieving intended objectives. This adaptive management approach preserves and enhances natural resources while providing the optimum environmental conditions required to sustain the military mission and realistic training conditions.

### **Forest Management**

The forestry program manages 39,961 acres of forest on PCMS, which is approximately 17 percent of the installation. Forestry program treatments are designed to reduce stand densities in order to increase tree vigor, reduce wildfire risk, improve wildlife habitat, maintain and or increase species diversity, reduce the occurrence of non-native tree species, and support the military mission. The Forest Management Plan serves as the primary guidance for the forest management program on Fort Carson and PCMS. The Forest Management Plan outlines the installation's proposed management strategy and goals for each type of forested habitat occurring on Fort Carson and PCMS.

Per the Forest Management Plan, a variety of silvicultural methods may be employed to reduce stand densities to the desired level. Some of these methods may include (Fort Carson, 2011c):

- Selection – selection and cutting of individual trees or small groups of trees. This type of system is designed to create or maintain uneven-aged stands. Advantages include the establishment of natural regeneration, maintenance of continuous forest cover, creation of openings, and the increase in vertical and horizontal vegetation diversity for wildlife. This method may, however, result in damage to residual trees and may not allow for prescribed burning.
- Sanitation Harvest –the removal of diseased trees such as those attacked by engraver beetles to promote stand health.
- Stand regeneration – method of planting new seedlings to create a new stand. Natural regeneration is the preferred method because natural seedlings descend from adapted parent trees. Artificial regeneration methods have been used following a stand-replacing wildland fire.
- Prescribed burning – a tool used to reduce fuel accumulations, kill undesirable vegetation, and improve wildlife habitat. A burning program that mimics the natural fire regime (preferably every 7 to 10 years) in prairie and ponderosa pine forest would maintain ecosystem structure and function. A mosaic of burned and unburned areas tends to maximize “edge effect”, which promotes large and varied wildlife populations and reduces the possibility of a catastrophic wildfire. Fires can stimulate fruit and seed production, increase production of legumes, grasses, shrubs, and trees, as well as create openings where wildlife may feed and mate (U.S. Army, *undated*).

#### **3.7.1.4.2 PCMS Training Mission and Natural Resource Management**

Military training can have both positive and negative effects on natural resources. The two major types of training conducted are maneuvers and live-fire exercises. Impacts resulting from these activities include the destruction of habitat and soil erosion. Maneuver damage is by far the most widespread negative effect on the natural resources at PCMS. Maneuvering heavy tracked and wheeled vehicles across even the best-suited landscapes can cause damage to vegetation and soils. For this reason, timely land rehabilitation efforts at appropriate intervals are beneficial. Vegetation as well as soils can be damaged by regular use on areas such as trails, bivouac sites, and firing points. In addition, vehicles can transport invasive species when relocating from



other training sites. Wildlife populations can also be harmed by field equipment training, small arms firing, or by mission-related wildfires.

The intensity, severity, and types of resulting environmental impacts depend to a great extent upon the type of units involved in training, where training activities are concentrated, and the duration of the action. Low impact activities are those that generally do not disturb the vegetation or soils and require no rehabilitation. Medium impact activities may cause some disturbance or change that may require minor rehabilitation or may recover over time without aid. High impact activities typically cause significant change to the soils or vegetation of the area, which require timely attention to avoid or minimize long-term alteration of existing conditions. Some training activities may be conducted at different levels of disturbance.

Five basic management techniques can be used to minimize military training effects to the vegetation resources: (1) limit total use (2) redistribute use (3) modify kinds of uses (4) alter the behavior of use and (5) manipulate the natural resources for increased durability.

Natural resource concerns may restrict military training at times. For example, in order to avoid sensitive areas such as wetlands, some areas may be restricted to dismounted training or have off-road vehicle maneuvers prohibited. Temporary restrictions may occur due to protected species or conservation laws surrounding certain species (i.e., nesting golden eagles protected under the Bald and Golden Eagle Protection Act). This includes notifying trainers at radio control and posting a NOTAM to pilots of the seasonal restrictions around active golden eagle nests. In addition, temporary restrictions may be implemented to allow for recovery time due to natural occurrences (i.e., heavy precipitation).

FC Reg 350-4, *Training Piñon Canyon Maneuver Site*, prescribes policy, procedures, and responsibilities used to support ranges and training at PCMS. Items within this regulation related to biological resources include fire warning conditions (see Section 3.7.1.5, Wildland Fires) and the following biological resource protections during training exercise planning and executions for maneuver training (Fort Carson, 2011a):

- Do not cut or cause trees to fall
- Do not destroy or harass wildlife. Follow the laws and regulations established to protect endangered species
- Use existing roads and tank trails
- Mounted units may cross streams only at designated stream crossing sites
- Mounted traffic will not use designated no-drive/no-dig areas to include environmentally sensitive areas

In addition, FC Reg 350-10, *Maneuver Damage Control Program*, prescribes procedures and policy for the control of maneuver damage. Similar to 350-4, this regulation encourages commanders to “Maximize the use of existing routes and trails. Avoid creating new routes and trails”. This regulation also outlines the minimization of neutral steer turns (i.e., a turn during which one of the tank’s tracks moves forward while the other moves in reverse, allowing the vehicle to turn on the spot) which are more likely to “destroy vegetation, compact the soil, increase the probability of erosion and leave evidence of operations” (Fort Carson, 2011b). As discussed in Section 4.2.4, After Action Reports (AARs), prior training events show that vehicles sometimes drive parallel to existing roads in order to avoid dusty or muddy conditions. However, utilizing the existing road and trail system at PCMS provides a way for vehicles to access remote areas without impacting vegetated areas (VersarGMI, 2014).

#### 3.7.1.4.3 Wildlife Management

Fort Carson maintains healthy populations of game and non-game fauna on PCMS in a manner consistent with the military mission. As part of maintaining a diverse, self-sustaining ecosystem, PCMS supports populations of non-game mammals, birds, amphibians, reptiles, fish, and invertebrates, as well as habitat suitable for each species, on the installation. Biologists conduct species inventories, monitor population trends, and manage habitat for non-game species. Species that are rare, imperiled, or otherwise declining are monitored, and habitat is managed to support declining species to the extent practicable.

Biologists develop and implement species-specific management plans, monitor population trends and manage habitat for fish, wildlife, and invertebrate species. Management of fish and wildlife is integrated with forestry, land management, and the ITAM program. In accordance with DoD and U.S. Army policies, fish and wildlife management on PCMS is conducted in cooperation with the USFWS and the CPW.

Per the installation's INRMP, general migratory bird management on Fort Carson and PCMS include (Fort Carson, 2013a):

- Managing habitat by seeding, prescribed fire, insecticide dusting of key prairie dog colonies for supporting burrowing owls and eagles, and erecting artificial raptor nest structures
- Consulting (informally) with the USFWS regarding the limited use of poison grain for lethal control of prairie dogs
- Prohibiting the application of above ground pesticides that could affect nesting migratory birds
- Conducting protected species pretreatment survey at sites identified for lethal control of prairie dogs
- Managing woodlands to enhance value to migratory birds, to reduce insect-related diseases, and to improve wildlife habitat

In addition, the installation's wildlife office reviews project proposals for potential conflicts with the MBTA, identifies species present in the action areas, and identifies permits, documents, collaboration, and recommendations for an action to proceed and remain in compliance with the MBTA (Fort Carson, 2013a).

#### 3.7.1.4.4 Noxious, Invasive and Pest Species

A noxious plant is any plant designated by a Federal, state, or local government as injurious to public health, agriculture, recreation, wildlife, or property. Noxious plants are often defined as plants that are growing out of place, that are competitive, persistent, and pernicious. An invasive species is an alien (non-native) species whose introduction causes, or is likely to cause, economic or environmental harm, or harm to human health (EO 13112). The USDA, Animal and Plant Health Inspection Service defines a pest species as any biotic agent (any living agent capable of reproducing itself) that is known to cause damage or harm to agriculture or the environment.

EO 13112 requires coordination and enhancement of Federal activities to control and minimize the economic, ecological, and human health impacts caused by invasive species. The term "non-native" reflects only the origin of the plant and not its ecology. Therefore, not all alien or non-native plants are invasive (in fact, only a small fraction of them are). Department of the Army Memo "Army Policy Guidance for Management and Control of Invasive Species" (June, 26

2001) provides guidance on implementing the EO. Of the 71 state-listed species currently designated for containment, control, or eradication, at least 30 have invaded natural and/or urbanized landscapes at Fort Carson and PCMS (Fort Carson, 2013a). A prior study conducted in 2007 listed 25 invasive species as occurring within Fort Carson and PCMS; of these, 13 were found at PCMS (Fort Carson, 2007a). Per the INRMP, PCMS priority species for management are: Russian knapweed (*Acroptilon repens*), spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*), Scotch thistle (*Onopordum acanthium*), and African rue (*Peganum harmala*) (Fort Carson, 2013a).

- Russian knapweed – a creeping perennial that reproduces from seeds and vegetative root buds and grows 18 to 36 inches tall. This species is native to rocky, sandy or clay soils of southern Ukraine, southeast Russia, Iran, Kazakhstan, and Mongolia. In Colorado, it is no longer restricted to certain soils and occurs in pastures, agronomic crops, roadsides, waste places and rangeland (Beck, 2013).
- Spotted knapweed – native to Eurasia, this species was first recorded in North America in Victoria, British Columbia in 1883 and was likely introduced as a contaminant in alfalfa or clover seed and through discarded soil used as ship ballast. Spotted knapweed is now found in 26 states. This biennial or short-lived perennial typically forms a basal rosette of leaves in its first year and flowers in subsequent years. During its flowering stage, the plant can measure between 8 and 50 inches tall. In the U.S., this plant may be found in a variety of habitats, including elevations up to and over 10,000 feet above MSL and in precipitation zones receiving 8 to 80 inches of rain per year. Preferred habitats including well-drained, light-textured soils that receive summer rainfall, including open forests dominated by ponderosa pine and Douglas fir, and prairie habitats dominated by Idaho fescue, bluebunch wheatgrass, and needle and thread grass (Plant Conservation Alliance's Alien Plant Working Group, 2005).
- Canada thistle – this perennial plant reproduces through both root shoots and seeds. A single plant can colonize a 3- to 6-foot diameter area in 1 or 2 years. While the Canada thistle grows in a variety of soils, it is most competitive in deep, well-aerated, productive, cool soils that receive 17 to 35 inches of rain per year. The plant's extensive root system is what makes this species so difficult to control; horizon roots may extend over 15 feet while vertical roots may grow to 15 feet deep. New shoots and roots can form almost anywhere along the root system of an established plant, and the small roots can remain viable over 100 days without photosynthesis (Colorado State University Extension, 2013).
- Scotch thistle – this biennial species, native to Eurasia, may grow to heights of up to 12 feet. It is typically found along roadsides, irrigation ditches, waste areas, and on rangelands. Its preferred habitats include areas adjacent to riparian areas along streams, lower alluvial slopes, and bottomlands. Scotch thistle reproduces via seeds, which may remain viable for 30 years in the soil and may be transported by humans, animals, machinery, wind, and/or water (Colorado Weed Management Association, 2012a).
- African rue – two populations of this perennial forb were identified within PCMS in 2004. So far, these are the only known populations in Colorado; none of these plants were found in subsequent surveys conducted in 2006 and 2007 (Linn, 2007). African rue is native to northern Africa, the Middle East, and Tibet, but was first recorded in the U.S. in New Mexico in 1928. Aboveground portions of African rue are small compared to the belowground root system; the plants may group 1.5 feet tall and 3-4 feet wide, but the roots may reach 20 feet deep. This species is extremely drought-tolerant and produces

allelopathic chemicals that slow or prevent the growth of other plant species (Colorado Weed Management Association, 2012b).

The Invasive Plant Management Plan presents management strategies used by the installation to control noxious and invasive plant populations. Per the installation's Invasive Plant Management Plan, "The overall objective of the Fort Carson and PCMS invasive plant management program is to implement effective, environmentally sound control methodologies for all state and county listed species in accordance with any applicable Federal, state and county laws and regulations" (Fort Carson, 2007a).

As a preventative measure to control the potential introduction or spread of non-native, invasive, or noxious plant species, the Fort Carson Fire Department brings in a 5,000-gallon tanker to spray down all vehicles being rail-loaded before and after coming out of the field. Future plans include the construction and operation of a permanent vehicle wash station to wash down all vehicles on PCMS (see Section 4.2 for a list and discussion of current, ongoing, and reasonably foreseeable projects at PCMS). Washing vehicles removes plant seeds, stems, or roots that could propagate when transported and be introduced to a new area through movement of the vehicle.

Should a non-native plant species become established, Fort Carson would employ an integrated invasive plant management technique using a combination of multiple control methods to achieve the desired goal. Potential tools utilized by the installation may include (Fort Carson, 2007a):

- Education tools – videos, brochures, slide presentations, and media articles can all be used to inform the general public and military trainers about the causes and effects of invasive plant infestations on natural resources and the military training mission.
- Preventative measures – using invasive species-free seed and hay for revegetation; quickly eradicating small, isolated populations of newly identified invasive plant species; and cleaning field equipment before transporting to other areas. These measures keep invasive plants from occurring or increasing in an area.
- Biological control measures – using insects, mites, nematodes, or plant pathogens that are the natural enemy of invasive plant species to reduce the dominance of the plant species to a more acceptable level by killing or weakening the plants and making them less competitive in the native community. The biological control of invasive plants has gained in popularity because it is cost-effective, environmentally safe, and self-perpetuating. The effects of this method, however, are not immediate or always adequate in their level of control. Biological control is a long-term undertaking since it may take several years to establish a large, viable natural enemy population that is capable of dispersing over extensive areas.
- Chemical control measures – herbicides are the most widely used method for controlling invasive plants and are generally considered the most economical and effective options. Herbicides, however, can pose environmental risks such as water contamination; animal or human toxicity; development of herbicide resistant invasive plants; and the loss of native plant diversity. The Army has developed guidance calling for the reduced use of pesticides and herbicides; therefore, widespread herbicide application may not be feasible on PCMS.
- Land control measures – employing land management practices that maintain and promote healthy native plant and soil communities. The Fort Carson and PCMS natural resources management program has in place an active revegetation and erosion control program designed to maintain and promote healthy rangeland plant communities and is

integral to the success of the invasive plant management program. Minimizing the extent and severity of ground disturbance resulting from military training activities is critical for sustaining healthy plant communities and restricting opportunities for weed establishment.

- Physical/mechanical measures – measures that physically disrupt invasive plant growth and reproduction and include practices such as tillage, hoeing, hand-pulling, mowing, burning, and grazing (goats). Depending on the target plant species, many of these measures can be ineffective and labor intensive. Soil disturbance and the fragmentation of plant parts due to these measures can actually stimulate an invasive plant population. With careful timing and application, and in combination with other control measures, these practices may be useful for invasive plant control. Invasive plant control using these methods is normally achieved by reducing the seed source or removing other reproductive plant parts.

### 3.7.1.5 Wildland Fires

Wildland fires may be ignited by military training (i.e., tracer rounds, flares, grenade simulators) or other causes (i.e., hot mufflers, arson, lightning) and may burn with intensities capable of causing loss of life, loss of property, or detrimental impacts to natural resources. The fire management program on PCMS focuses on containing and responding quickly to wildland fires. The program also uses prescribed fires to reduce potential fuel loads and thus the chances of catastrophic wildland fires. The Fort Carson and PCMS Integrated Wildland Fire Management Plan (IWFMP) lays out specific guidance, procedures, and protocols in the prevention and suppression of wildfires on all Installation training lands with wildland fuels. Its goal is to convey the methods and protocols necessary to minimize fire frequency, severity, and size that allow the continuation of military training. The IWFMP also 1) defines the responsibilities of all offices, departments, and agencies involved; and 2) describes fire pre-suppression and suppression actions to be taken on strategic as well as tactical bases (U.S. Army, *undated*).

On active firing ranges, a minimum of a 100-foot buffer strip exists along all perimeters, where feasible, which should be sufficient to contain any unintentional starts and assist in maintaining planned training schedules (Fort Carson, 2013a).

As fire hazard conditions increase, military personnel would take appropriate precautions to limit potential fire-producing activities. In accordance with FC Reg 350-4, Training at PCMS, when the fire danger class rises to Class 4 or above (see Table 3.7-1), use of incendiary training aides (e.g., pyrotechnics, artillery simulators and smoke-producing devices), demolitions, explosive ammunition, flame producing ammunition (e.g., tracers, flares) or similar would cease. Such activities could only resume when the fire danger class drops below Class 4. In addition, whenever conducting live-fire exercises, a designated firefighting detail is equipped with fire beaters, shovels, and rakes and is prepared to extinguish any fire initiated by live-fire training. This detail is present regardless of the fire danger class condition. Also, during aviation training, PCMS fire trucks remain on standby along the runway until the training session is over.

**Table 3.7-1. Fire Danger Classes at PCMS**

| Spread Index <sup>a</sup> | Fire Danger Class | Fire Behavior                                                                                                                               |
|---------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 0-4                       | Class 1           | Fire spreads slowly and tend to die out.                                                                                                    |
| 5-9, moderate             | Class 2           | Fire spreads in grass and leaves until extinguished.                                                                                        |
| 10-19, high               | Class 3           | Fire burns briskly and spreads rapidly. Short-distance spotting may occur.                                                                  |
| 20-39, very high          | Class 4           | Fire spreads rapidly and tends to crown in young conifer stands. Long-distance spotting is common. Intense convection activity may develop. |
| 40 and above, extreme     | Class 5           | Fire burns fiercely and spreads rapidly. Where vegetation occurs in quantities, fire may be unmanageable.                                   |

Source: FC Reg 350-4.

a. The spread index is calculated using a combination of temperature, humidity, wind, and fine fuel state and represents the threat of a fire burning out of control.

### 3.7.2 Environmental Consequences

This section provides a discussion of the environmental impacts to biological resources that would result from the No Action and Proposed Action alternatives. Impacts were primarily assessed by reviewing existing biological resource conditions at PCMS, and determining the potential effects that training and operation components would have on vegetation, wildlife, protected species, and wildland fire. A significant impact to biological resources would result in a substantial permanent conversion or net loss of habitat at the landscape scale; a long-term loss or impairment of a substantial portion of local habitat (species-dependent); or in an unpermitted or unlawful “take” of threatened and endangered species or species protected under the MBTA and BGEPA. Table 3.7-2 provides a comparison summary of anticipated level of impacts.

**Table 3.7-2. Summary of Biological Resources Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            |       | X        |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         |            |       | X        |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            |       | X        |             |            |
| Combined Elements <sup>a</sup>        |            |       |          | X           |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         |            |       | X        |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            |       | X        |             |            |
| Aviation Gunnery and Flare Training   |            | X     |          |             |            |

**Table 3.7-2. Summary of Biological Resources Impacts**

| Alternative                    | Negligible | Minor | Moderate | Significant | Beneficial |
|--------------------------------|------------|-------|----------|-------------|------------|
| Electronic Jamming Systems     |            | X     |          |             |            |
| Laser Targeting                |            |       | X        |             |            |
| Demolitions Training           |            |       | X        |             |            |
| UAS Training                   | X          |       |          |             |            |
| UGV Training                   | X          |       |          |             |            |
| Airspace Reclassification      | X          |       |          |             |            |
| DZ Development                 |            | X     |          |             |            |
| Combined Elements <sup>a</sup> |            |       |          | X           |            |

a. Overall combined level of direct impact to biological resources would remain potentially significant. Long-term increases in BCT training at PCMS requiring large maneuver footprints could potentially result in a conversion or net loss of habitat at landscape scale, dependent upon frequency of use and recovery time.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.7.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Under the No Action Alternative, there would be no changes to current training levels or operations at PCMS as described in Section 2.2.1, Continue Existing Mission and Training Operations at PCMS. As shown in Section 2.5.3, Restoration and Rehabilitation of PCMS Training Lands, the most recent ABCT training exercise during wet conditions resulted in rutting and exposure of soils within 1,200 acres which are currently being rehabilitated. Damage to the soils caused loss of vegetational coverage throughout this area. As part of the rehabilitation effort, Fort Carson graded, disked, seeded (with native short grass prairie seed mixtures), and mulched the disturbed areas. Vegetation recovery within these areas will continue.

Similar impacts to vegetation and habitat from training with tracked vehicles would continue. Disturbances would continue to be mitigated through the ITAM efforts in order to maintain the long-term sustainability and availability of lands for military use. Existing land and environmental management programs as described in Section 2.5.2 would continue.

Fort Carson would also continue to implement its INRMP, IWFMP, Forest Management Plan, and Invasive Plants Management Plan to manage impacts to biological resources occurring from ongoing training activities. Moderate adverse impacts would occur to biological resources from ABCT training due to the heavy tracked vehicles used during these training activities. PCMS's management practices and the protocols outlined in Section 2.5.2, Protection of PCMS Resources, address the management of natural resources to lessen impacts and to restore areas after training exercises (also refer to Section 4.2.4, Draft Historic Vegetation and Soil Impact Studies).

## **3.7.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

### **3.7.2.2.1 ABCT, IBCT, and SBCT Training**

BCT training activities at PCMS and the use of Stryker vehicles as part of Alternative 1A would result in vegetation disturbance. ABCT, IBCT, and SBCT training would all cause similar types of direct and indirect impacts to biological resources. Impacts caused by ABCT training, however, would be greater in intensity due to its use of heavier, tracked vehicles. IBCT training would include foot traffic and use lighter, wheeled vehicles, while SBCT training would utilize light, wheeled vehicles. Accordingly, potential impacts resulting from IBCT and SBCT training would likely be lower when compared to those resulting from ABCT training. Individually, these events would result in minor adverse effects to biological resources from IBCT training and moderate adverse impacts to biological resources from ABCT and SBCT training. The combined intensity of BCT training and the ability of the land to recover could cause significant adverse effects to biological resources. Long-term increases in training intensity at PCMS requiring large maneuver footprints due to wheeled and tracked vehicles could potentially result in a conversion or net loss of habitat. This could occur at landscape scale through vegetation loss and conversion over widespread areas if areas are not adequately rotated, nor given necessary recovery times (as described later in this section). Significant adverse impacts would be reduced to less-than-significant levels with implementation of the mitigation measures discussed in Section 3.7.3, Mitigation Measures.

Direct impacts associated with the operation of armored vehicles and heavy equipment for ABCT training includes degradation of vegetative communities during training maneuvers, especially if those maneuvers are conducted by heavy, tracked and wheeled vehicles in wet conditions. For this reason, Fort Carson established a color coding system for soil conditions (see Section 2.5.2, Protection of PCMS Resources). PCMS soil conditions (green, amber, and red) are published by Range Operations (FC Reg 350-4, FC Reg 350-10). Under amber conditions, soils are wet and training should be limiting to trails, roads, and dismounted operations. Under red soil conditions (i.e., when soils become saturated and vehicles may leave tracks measuring three inches deep), training should be limited to primary MSR and only dismounted (non-mechanized) operations. Tracked vehicles can directly impact existing plant communities through shearing and crushing of plants and indirectly impact vegetation through soil compaction effects on water, nutrient, and soil-gas dynamics. Tracks created by the passage of such vehicles remain visible for an average of two years after the initial event (Milchunas et al., 1999). Furthermore, disturbed areas are frequently invaded by non-native vs native species. If an area is disturbed during a training event and subsequently lacks vegetation, it enters a rehabilitative state and is restricted from most uses until achieving a minimum vegetation cover of 65 to 70 percent (see Section 2.5, Existing PCMS Training Protocol and Range Management). Section 2.5.3, Restoration and Rehabilitation of PCMS Training Lands, discusses a recent rehabilitation effort after a training event over wet soil.

Per FC Reg 350-10, Fort Carson establishes use areas within each Training Area of PCMS to protect resources and for rehabilitation. These use areas, including Limited-Use Areas, Off-Limits Areas and Dismounted-Only Training Areas, are intended to minimize the potential environmental impacts caused by maneuver damage incurred during training (see Section 3.2, Land Use). Limited-Use Areas typically retain this status for three years, which allows vegetation to regrow and the ground to recover to the point where tracks created during previous training events are no longer visible. While in a Limited-Use status, vehicles may only use existing routes or trails. Dismounted Soldiers may conduct off-road training, but may not dig or bivouac. Section 3.5, Geology and Soils, provides details regarding potential impacts of BCT



training on soils. The *Draft Historic Vegetation and Soil Impact Studies* indicate that disturbed areas recover; however, recovery cannot be attributed to reseeding efforts. It is likely that reseeding helps to recover areas of disturbance, but the extent is unclear (VersarGMI, 2014). Vegetation communities and cover within the region surrounding PCMS are highly variable and can change over time due to precipitation, military training, grazing, and fire occurrence. Extended periods of drought can also place stress on vegetation growth and recovery. The quick establishment of native vegetation from reseeding efforts has reduced the spread and dominance of invasive species during land rehabilitation efforts, but at lower vegetation cover densities. Army efforts to rehabilitate the land following training exercises have prevented permanent conversion and net loss of habitat at a landscape level (VersarGMI, 2014).

Shortgrass prairie habitats are generally considered to be resistant to aboveground disturbances, but susceptible to underground disturbances as a large proportion of plant biomass and nutrient storage occurs below the ground surface (Milchunas et al., 1999). When possible, Fort Carson would conduct heavy maneuver training at PCMS in dry weather conditions (i.e., green soil conditions), thus avoiding training when the ground is wet and vehicle tracks could impact soil to a greater depth.

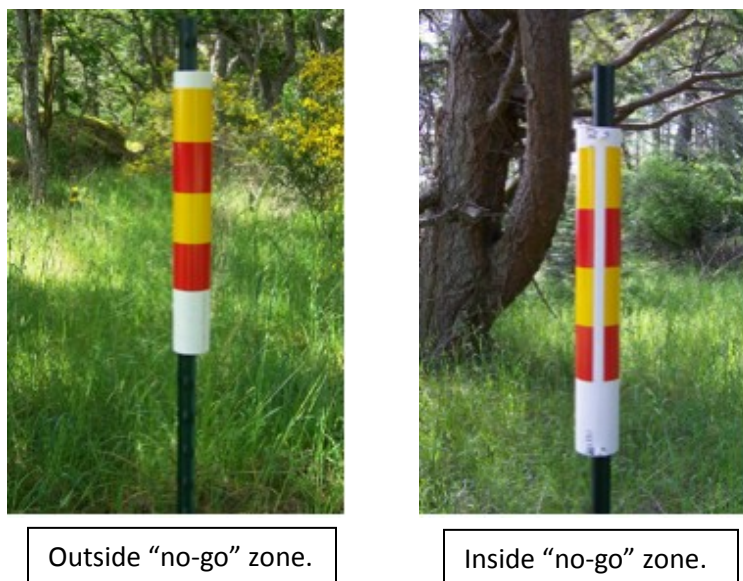
Milchunas et al. (1999) found that the use of tracked vehicles at PCMS generally reduced the average height of the local plant community. Trees and shrubs could be damaged by a passing vehicle or by the middle of a vehicle passing over trees and shrubs. Crushed vegetation may sprout and damaged plants may still persist after training, indicating that training activities involving the ABCT may not change the species composition of existing plant communities. Altering the height of remaining plants or reducing the amount of heterogeneity in habitat structure, however, could adversely impact bird and rodent species diversity and reduce cover for wildlife (Milchunas et al., 1999). The *Draft Historic Vegetation and Soil Impact Studies* indicate areas of vegetation loss largely in association with the trail network and at trail intersections. The overall cumulative results indicate that there is a long-term cover loss for the heaviest-used areas and a recovery in vegetation for less-used areas (VersarGMI, 2014).

Training intensity (i.e., increased Soldier and equipment density per BCT-level events) would add stress to vegetation and increase the potential for loss of vegetation and habitat degradation. As described in Section 2.2.2.1, however, the Army would establish a BCT-level training intensity limit using SMAs and Total Task Miles to complement the 4.7-month brigade-level training period duration. This approach would allow the Army to manage brigade-level training periods using intensity and duration metrics, rather than just duration alone, and provide the Army with an additional measure regarding intensity of BCT training to manage training lands. The use of an additional metric to gauge training land sustainability would be an overall benefit to biological resources as the Army would cease brigade-level training when either the duration or intensity metric, whichever comes first, is attained during a training year. As discussed in Section 2.2.2.4, Alternative 1A includes the use of Stryker vehicles for training exercises. Due to the lighter weight of a Stryker for SBCT training compared to an M1 tank or a Bradley Fighting Vehicle for ABCT training (i.e., 20 tons compared to 67.6 tons and 27.6 tons, respectively), the actual maneuver impact of proposed training activities of the SCBT would be reduced by 5 percent over current ABCT levels.

The intensity of Soldiers and equipment associated with BCT training would also result in adverse impacts to wildlife species within PCMS. Larger, more mobile species would likely avoid areas in which units would be training. Smaller species, however, may not be as able to avoid the paths of oncoming vehicles and may be crushed during training activities. This loss of a small number of organisms would not represent a significant proportion of the total local or regional species population. Only a minor adverse impact would be expected. The potential exception to this is in the case of Army SARs or the state-listed burrowing owl. While the four

known Army SARs within PCMS and the burrowing owl habitat (i.e., abandoned prairie dog burrows) may be susceptible to crushing during BCT training activities, the Army would survey areas for these species prior to conducting such activities. Known populations or known habitat of species such as the mountain plover would be marked in the field and avoided during training exercises. Burrowing owl habitat (active prairie dog colonies) is avoided during certain training activities such as bivouacking for health reasons.

Military installations generally mark areas to be avoided with Seibert stakes or Seibert signs. Per FC Reg 350-10, these stakes and signs within PCMS signify “NO DIGGING and NO VEHICLE TRAFFIC”. A Seibert stake is a metal post topped with a 17-inch section of white PVC pipe. Four bands of alternating red and yellow reflective tape incompletely circle the pipe so that a narrow, vertical white stripe remains visible. This white stripe is positioned inward when placed around the perimeter of a “no-go” area so that an individual may know whether he or she is inside or outside of the no-go zone. Figure 3.7-2 depicts a Seibert stake.



**Figure 3.7-2. Seibert Stakes**

While the use Seibert stakes or Seibert signs would help identify avoidance areas, wildlife may not always remain within the identified areas. The Army would limit potential adverse impacts to sensitive, slow-moving species (i.e., Texas horned lizard, triploid checkered whiptail, etc.) by avoiding potential habitat to the extent practicable, only utilizing approved, established routes, and being observant while conducting maneuvers. While the limited loss of a certain species, including those listed above, occurs occasionally, such incidents are not intentional and do not represent a problematic, significant reduction in existing populations. In addition, personnel are required to fully comply with applicable Army, installation, and Federal regulations and guidelines regarding protected species.

Noise associated with BCT training activities could adversely affect wildlife, disrupting normal behaviors or causing area avoidance during and following training events. The changes in the intensity of ABCT maneuvers training would incrementally increase noise. A theoretical doubling in maneuvers training would increase noise levels by 3 dBA, and the proposed one-third increase would raise the noise level by less than 1 dBA. The total number of Brigade-level training events would not increase, and as with existing conditions, the frequency of these events would be periodic. In addition, due to the recent conversion of an ABCT to an SBCT the total number of future ABCT training events and associated noise would be replaced on a one-

for-one basis with proposed SBCT exercises using Stryker vehicles. Because the changes in noise from ABCT training events would be less than 1 dBA and half of the ABCT training would be converted to SBCT training, noise effects to wildlife would be negligible. Potential noise resulting from the proposed conduct of BCT training at PCMS is expected to be consistent with the current noise environment (see Section 3.4, Noise).

Fort Carson would continue to implement appropriate Federal regulations, FC Regs, and BMPs at PCMS to manage and reduce potential adverse impacts. Vehicles would follow approved routes and travel in columns in order to reduce potential impacts to vegetation. Per FC Reg 350-4, training units would not cut trees, would not destroy or harass wildlife, and would only utilize existing roads and tank trails. As invasive plant species are more likely to become established in areas of ground disturbance, all disturbed ground would be backfilled and repair of all wear and tear damage caused by training would be performed using the site-specific approved seed mix. Fort Carson has a specially tailored native seed mix for PCMS (Fort Carson, 2014c). The PCMS seed mix is presented in Table 3-7.3. Seeding would follow paths along the natural contours of the site in order to reduce erosion and would cease during sustained winds of or exceeding 25 miles per hour to maintain efficiency.

**Table 3.7-3. PCMS Seed Mixes**

| Common Name                | Scientific Name               | Pounds of Live Seed per Acre |                    |
|----------------------------|-------------------------------|------------------------------|--------------------|
|                            |                               | General Seed Mix             | Rangeland Seed Mix |
| Barton western wheat grass | <i>Agropyron smithii</i>      | 4.0                          | 1.5                |
| Vaughn sideoats grama      | <i>Bouteloa curtipendula</i>  | 3.0                          | 1.75               |
| Alkali sacaton             | <i>Sporobolus airoides</i>    | 0.2                          | 0.1                |
| Sand dropseed              | <i>Sporobolus cryptandrus</i> | 0.4                          | 0.25               |
| Ladak alfalfa              | <i>Medicago sativa</i>        | 0.5                          | 0.25               |
| Blue grama                 | <i>Bouteloua gracilis</i>     | 1.0                          | 0.5                |
| Purple prairie clover      | <i>Dalea purpurea</i>         | 0.5                          | 0.25               |
|                            | <b>Total</b>                  | <b>9.6</b>                   | <b>4.6</b>         |

Source: Fort Carson, 2014.

### **3.7.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

#### **3.7.2.3.1 ABCT, IBCT, and SBCT Training**

Section 3.7.2.2 discusses potential impacts regarding proposed BCT training activities. As analyzed within Alternative 1A, brigade maneuver training would result in individually moderate adverse impacts to biological resources, and potentially significant impacts from combined BCT training activities. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts from readiness training using new tactics and equipment are discussed below.

#### **3.7.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

Non-explosive aviation gunnery training at Range 9 and proposed SDZs in Training Areas 7 and 10 would result in moderate adverse impacts to biological resources. The rockets or ballistics

utilized during these test events would disturb soils, impact wildlife, and remove or degrade vegetation at and surrounding the temporary targets established for the event. The level of direct impact would be localized and limited to small pothole-sized disturbances at the point of impact. The temporary targets, however, would be placed in locations to minimize disturbances or removal of vegetation. Vegetation within Range 9 includes a mix of grasslands, shrubs, and trees, while vegetation within the proposed SDZs consists of grasslands and shrubs (see Figure 3.7-1). The Army would reduce the adverse effects caused by aviation gunnery training activities by repairing the area impacted during target placement and other set-up and take-down activities. Repair activities may include reseeded bare soil. Per FC Regs 350-4 and 350-10, Soldiers and vehicles would only use existing trails or approved routes when travelling to and from training sites as a further effort to reduce potential adverse impacts to vegetation.

Wildlife species in the vicinity of the point of impact could be injured or killed. Therefore, the Army would suspend live fire training activities if an animal was observed within the training area. No protected species are specifically known to inhabit Range 9 or the proposed SDZs. SARs, including the triploid-checkered whiptail, have been observed in Range 9, and other mobile animals and may move into the area over time. The Army would verify that Range 9 and the SDZs are clear of large animals prior to initiating training activities Per FC Reg 350-4. If wildlife enters a range, the training unit would follow published procedures and contact DPW-E for assistance in removing the wildlife.

In order to reduce the potential of the back-blast of a rocket launch igniting a wildland fire, rockets would be fired at a floor altitude of 20 feet AGL or above and a fire angle of 5 degrees or greater (see Section 3.11, Airspace). Prior to launch, the launch site would be cleared of ignitable debris. Fort Carson would adhere to all applicable guidance regarding wildland fires, including the IWFMP at PCMS (U.S. Army, *undated*).

Flare training would include the use of flares, which contain metals. The flares are designed to burn out prior to reaching the ground, so no direct adverse impacts to biological resources are anticipated. In order to ensure that the flares extinguish prior to reaching the ground surface, flares would only be deployed from altitudes of greater than 1,500 feet AGL (see Section 3.11, Airspace).

### **3.7.2.3.3 Electronic Jamming Systems**

The use of electronic jamming systems and the associated EW training would have negligible to minor adverse impacts to biological resources. As discussed in Section 2.2.3.2, Electronic Jamming Systems, this component of Alternative 1B would utilize radio frequency inhibitors using DoD-approved frequencies. The electromagnetic jamming system is not to be confused with ultrasonic jamming systems. The latter utilizes ultrasonic (i.e., outside the range of normal human hearing) sound frequencies that could potentially affect wildlife species, particularly the echolocation process of bat species. Electromagnetic jamming systems, like those proposed for use at PCMS and described in Chapter 2, do not utilize sound and would not have these potential effects on wildlife.

Conduct of EW training, using either vehicle- or ground-based equipment may result in potential impacts to vegetation and ground cover through surface disturbance during occasional transport and use of this equipment outside of existing trails or approved routes. These indirect impacts would be reduced or avoided through use of the existing trail network to the greatest extent practicable.

#### 3.7.2.3.4 Laser Targeting

Laser targeting training may have minor to moderate adverse impacts to biological resources. Alternative 1B includes the use of Class 3B and Class 4 lasers. Per the Food and Drug Administration and the International Electrotechnical Commission, the governing bodies responsible for classifying lasers, these classes of lasers have the following hazards (USFDA, 2014):

- Class I/1 – Considered non-hazardous. Hazard increases if viewed with optical aids, including magnifiers, binoculars, or telescopes.
- Class II/2 – Hazard increases when viewed directly for long periods of time. Hazard increases if viewed with optical aids.
- Class IIIa/3R – Depending on power and beam area, can be momentarily hazardous when directly viewed or when staring directly at the beam with an unaided eye. Risk of injury increases when viewed with optical aids.
- Class IIIb/3B – Immediate skin hazard from direct beam and immediate eye hazard when viewed directly.
- Class IV/4 – Immediate skin hazard and eye hazard from exposure to either the direct or reflected beam; may also present a fire hazard.

The impacts described above refer to impacts to humans; however, animals may experience different impacts from each of these laser classes. For instance, bird eyes generally filter most damaging radiation, while human eyes are generally unprotected from thermal damage caused by radiation. One test conducted on birds showed that a Class 3B laser caused no ocular damage at a distance of one meter (USDA Animal and Plant Health Inspection Service, 2001). Damage of the eye would increase with the length of time spent looking directly at the laser source and whether the eye were focused at the time (i.e., if the light energy of the laser beam is concentrated on one area of the retina or diffused) (Department of the Air Force, 1990). If a bird flew through a laser beam extending between the ground and an aircraft, the bird would only be exposed to the beam for a matter of seconds. It is unlikely that the bird would look directly at the laser source within this time, or if so, for any significant length of time.

In order to reduce or avoid potential impacts caused to wildlife, Soldiers would observe all horizontal and vertical safety limits of the laser range. The laser range safety officer would also be onsite during all laser activities. As with other forms of training that could ignite fires, a fire suppression crew would be onsite to extinguish fires caused by lasers igniting existing vegetation.

Direct adverse impacts could result from transport of Soldiers and the equipment employed with the laser targeting systems (i.e., handheld and vehicular systems). The vehicles and equipment could disturb soil surfaces and vegetative communities, particularly if land outside of trail roads were used. These impacts are anticipated to be avoided through use of the existing trail network to the greatest extent practicable.

#### 3.7.2.3.5 Demolitions Training

Demolitions training conducted in proposed SDZs within Training Areas 7 and 10 could have moderate adverse impacts to biological resources. The use of small quantities of explosives could disturb the ground surface, remove or degrade vegetation, or harm wildlife within the SDZ radius. This form of training is consistent with the area's designation as an established training area, and bare soil would be repaired and revegetated following demolitions training events. Per FC Reg 350-4, if large game species enters a range, the training unit would follow published

procedures and contact Range Control for assistance in removing the animal. Training activities would only resume upon the animals' exit of the SDZ or the removal of the animal from the area. Noise produced by demolitions training would constitute a distinct and appreciable change in the overall noise environment at PCMS (see Section 3.4, Noise); therefore, moderate impacts to wildlife behavior (flight and avoidance) could occur due to demolitions training.

Demolitions training in the proposed breaching sites within Training Areas 7 and 10 would result in a change in the overall noise environment at PCMS, and would have the potential for significant adverse effects on wildlife. These effects would be from the potential displacement of burrowing owls, removal of burrowing owl habitat, and effects to other species of concern. No studies on the effects of noise to specific to burrowing owl or prairie dogs have been conducted. It is likely, as observed with similar raptor, reptile, and mammal species, however, that individuals displaced during training activities would return to the original area after the conclusion of military activity. Studies analyzing the movements of mule deer and a red-tailed hawk in response to military maneuvers found that animals increased their movement to accommodate military schedules. The military noise, however, did not permanently displace the animals, and both studied species returned to the original areas after military training subsided (Andersen, et al., 1986; Stephenson, et al., 1996). Direct adverse impacts could result from the transport of Soldiers and associated equipment used for the demolitions training to Training Areas 7 and 10. The vehicles and equipment could disturb soil surfaces and vegetation, particularly if land outside of existing trails were used. These impacts would be reduced or avoided through use of the existing trail network or approved routes to the greatest extent practicable.

#### **3.7.2.3.6 UAS Training**

UAS training would have negligible direct adverse impacts to biological resources. UAS operations could result in a bird strike and individual loss of a species. Overall effects to avian populations, however, would be negligible. Direct impacts could result from transport of Soldiers and equipment during training activities. The vehicles and equipment could disturb soil surfaces, particularly if land outside of existing trails or approved routes were used. These impacts could be reduced or avoided through use of the existing trail network to the greatest extent practicable and the proper repair/reseeding of disturbed areas.

#### **3.7.2.3.7 UGV Training**

UGV training would have negligible direct adverse impacts to biological resources. The comparatively small size of UGVs compared to the wheeled and tracked vehicles used in BCT training (each UGV weighs less than 500 pounds) and the short distance that the UGV would travel during operation would cause minimal amounts of soil disturbance. Direct impacts would result from transport of Soldiers and equipment during training activities. The vehicles and equipment could disturb soil surfaces, particularly if land outside of trail roads were used, or if vehicular fluids were spilled. These impacts are anticipated to be avoided through use of the existing trail network to the greatest extent practicable and the proper repair/reseeding of disturbed areas.

#### **3.7.2.3.8 Airspace Reclassification**

The reclassification of airspace would have no direct or indirect adverse impacts to biological resources. No ground-disturbing activities would occur. The periodic restriction of commercial and private aviators would not result in any impacts to biological resources within PCMS.

### 3.7.2.3.9 DZ Development

The establishment of two new DZs would have minor adverse impacts to biological resources due to the potential removal of woody vegetation. While the removal of woody vegetation is not currently planned, potential hazards for the troops utilizing the DZ would be removed (i.e., tree stumps, or trees that are already halfway cut down). Potential tree removal would cause a long-term alteration of the existing plant community, and therefore, to existing wildlife habitat. Figure 3.7-1 shows that only minimal forested habitat occurs within the proposed DZs. The majority of the existing vegetation within that area consists of grassland and shrubs. Drop activities and associated vegetation removal would create bare soil and disturb other vegetation. Drop activities would include heavy materials that could further disturb soils and crush vegetation and wildlife. Potential adverse impacts would be reduced through repairing and reseeding bare or disturbed soil in accordance with the INRMP and Fort Carson regulations.

### 3.7.3 Mitigation Measures

Potentially significant adverse impacts to biological resources caused by combined effects of BCT training each year at PCMS, including loss or degradation of existing vegetation, would be reduced to less-than-significant levels through implementation of mitigation measures. Enhanced application of existing land management programs, training land rotation, and continued ITAM efforts (as discussed in Section 2.5.2, Protection of PCMS Resources) would be necessary to offset training impacts and maintain vegetation coverage and habitat. Existing methods of achieving this goal currently used by Fort Carson include evaluating the effectiveness of habitat restoration activities (e.g., stabilizing soils, native reseeding, etc.), adjusting the timing for land recovery rotations, and limiting activities to highly localized areas so as to continually affect the same areas. Fort Carson would continue to evaluate the type, extent, and location of training damage. To the extent practicable, funding would be secured prior to training to ensure that damaged training lands are adequately repaired according to the ITAM program and FC 350-10. Restoration activities would be monitored for effectiveness and modified to best suit the needs of the installation, the affected vegetative community, and the form of training that caused the impact. Fort Carson would continue to evaluate the successes of mitigation efforts and modify future efforts, if needed, to reach and sustain biological resource management objectives while maintaining land sustainability for the training mission. These measures would reduce impacts; however, impacts to vegetation and habitat may not be reduced to less than significant depending on the condition of the soil, training activities, and corresponding level of disturbance to vegetation and habitat. In some instances, mitigation measures could require years of effort (e.g., during drought years) and could be dependent on available funding to be fully and successfully implemented. As necessary, training activities would be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain or snow event) following the color code system to minimize the impacts from rutting and vegetation loss. This strategy would reduce the level of vegetation and habitat disrupted during large-scale training activities or from individually minor, but collectively significant, training activities.

During flare training, flares would only be deployed from altitudes greater than 1,500 feet AGL to ensure that the flares extinguish prior to reaching the ground surface and avoiding the potential for wildland fire.

Prior to training activities, the Army would survey areas for SARs. Known populations or likely habitat would be marked in the field and avoided during training exercises. Military installations generally mark areas to be avoided with Seibert stakes or Seibert signs. Per FC Reg 350-10, these stakes and signs within PCMS signify "NO DIGGING and NO VEHICLE TRAFFIC". Following training, all disturbed ground would be backfilled and all wear and tear damage

1 caused by training would be reseeded using the site-specific approved seed mix. Invasive  
2 species are more likely to become established in areas of disturbed soil. Revegetation efforts  
3 using a native seed mix would decrease the likelihood of invasion and would thus restore  
4 disturbed areas to pre-training conditions.

5 While the use Seibert stakes or Seibert signs would help identify avoidance areas, wildlife may  
6 not always remain within the identified areas. The Army would limit potential adverse impacts to  
7 sensitive, slow-moving species (i.e., Texas horned lizard, triploid checkered whiptail, etc.) by  
8 avoiding potential habitat to the extent practicable, only utilizing approved, established routes,  
9 and being observant while conducting maneuvers. In addition, personnel are required to comply  
10 with applicable Army, installation, and Federal regulations and guidelines regarding protected  
11 species.

12 In accordance with the Bald and Golden Eagle Protection Act, the Army would maintain a buffer  
13 with a radius 0.5 miles (800 meters) from surface up to 3,000 feet above ground level around  
14 any identified golden eagle nest until the young have fledged. This buffer would exclude all  
15 aircraft operations and foot traffic (Fort Carson, 2013a). USFWS guidelines regarding the Bald  
16 and Golden Eagle Protection Act include measures to avoid the take or disturbance of golden  
17 eagles during the nesting season (i.e., generally from late January through late July). These  
18 additional measures to protect nesting golden eagles include the following (USFWS, 2012 and  
19 2002):

- 20 • Avoid blasting and other activities that produce extremely loud noises within 800 meters  
21 of active golden eagle nests unless greater tolerance to the activity has been  
22 demonstrated by the golden eagles in the nesting area.
- 23 • Avoid using off-road vehicles within 800 meters of a golden eagle nest during the nesting  
24 season.

25 Vehicles would be limited to existing routes and trails within dismounted maneuver areas to  
26 prevent damage to vegetation. In addition, set-up and take-down activities associated with other  
27 training exercises (i.e., aviation gunnery, lasers, etc.) would maximize use of existing trail  
28 networks. Should vehicle traffic remove existing vegetation, bare soil would be reseeded using  
29 an approved, site-specific, native seed mix. Reseeding efforts would restore the area to pre-  
30 training conditions and inhibit the establishment of invasive plant species.



## 3.8 Cultural Resources

### 3.8.1 AFFECTED ENVIRONMENT

#### 3.8.1.1 Cultural Resources Identification and Evaluation

The cultural resources inventory of PCMS began in the 1980s prior to the opening of PCMS. Numerous pedestrian surveys have resulted in the inventory of 219,278 acres (93 percent) of the 235,896 acres available for inventory, leaving 16,618 acres (7 percent) to be surveyed. The remaining un-surveyed acreage occurs within a protected interior fence boundary that is designated for dismounted-only training, and in canyon areas where both foot traffic and helicopter routes are permitted.

Identification and evaluation of cultural resources discovered on PCMS has been conducted in accordance with provisions set forth in Sections 106 and 110 of the NHPA, and the implementing guidance found in 36 CFR Part 800, *Protection of Historic Properties*. This work includes resources identified as properties of traditional, religious, or cultural significance to 1 or all 13 Federally-recognized Native American Tribes (Tribes) with a cultural affiliation to PCMS lands. Historic property evaluation to determine eligibility for inclusion in the National Register of Historic Places (NRHP) was accomplished using established criteria and guidance provided in 36 CFR 60.4. The term “historic property” is defined as a resource that has been officially determined to be eligible for inclusion in the NRHP through consultation with the SHPO. The term “protected property” as used in this EIS includes historic properties, cultural resources that need further evaluation (referred to as “needs data sites”), sites not yet reviewed for official concurrence (referred to as “no official determination sites), sacred sites, traditional cultural properties (TCPs), and burials/graves. All these site are afforded protection as though they are historic properties.

Under Section 106 of the NHPA the Army is required to “*take into account the effects of their undertakings on historic properties and afford the [Advisory] Council a reasonable opportunity to comment on such undertakings.*” In order to streamline the Section 106 compliance process, Fort Carson developed a Programmatic Agreement Among the Colorado State Historic Preservation Officer and the Advisory Council on Historic Preservation Regarding Military Training and Operational Support Activities at Piñon Canyon Maneuver Site, Fort Carson, Colorado (PCMS Training PA, 2014, <http://www.carson.army.mil/DPW/nepa%20documents/2014+PA+for+PCMS+Training+Military+Training+and+Operations.pdf>). Stipulations within this PA establish protection measures, a monitoring strategy, and a list of activities exempted from consultation as Fort Carson analyzes effects on historic properties and other protected properties from military training, other activities, and natural processes. In cases where Section 106 consultation would be necessary, review, evaluation, and analysis regarding the potential for adverse effects to historic properties would consider all characteristics that qualify a site for inclusion in the NRHP, including architectural elements or methods of construction (i.e., stacked or modified stone, adobe or sod blocks, as well as rock art, thermal/hearth features, unique or datable artifacts, etc.).

#### 3.8.1.2 Cultural Sequences for PCMS

Appendix B to this document contains a narrative cultural sequence for the prehistoric, proto-historic, and historic time periods for the regions surrounding PCMS, and includes information regarding the development and use of the maneuver site (Cultural Resources Management Program [CRMP] Database, 2014). These time periods are shown in the Table 3.8-1.

**Table 3.8-1. Cultural Record of Southeastern Colorado**

| Chronology          | Geologic Period  | Stage                | Period                                                                  |
|---------------------|------------------|----------------------|-------------------------------------------------------------------------|
| 12,000 BP           | Late Pleistocene | Pre-Projectile Point |                                                                         |
| 10,000 BP           |                  | Paleoindian          | Clovis<br>Folsom                                                        |
| 6,000 BP            | Early Holocene   | Archaic              | Plano<br>Early Archaic<br>Middle Archaic                                |
| 3,000 BP            | Middle Holocene  |                      | Late Archaic                                                            |
| 1,000 BP (AD 1,000) | Late Holocene    | Late Prehistoric     | Developmental<br>Diversification                                        |
| AD 1,600            |                  |                      | Proto-historic                                                          |
| AD 1,800            |                  | Historic             | Apache, Ute,<br>Comanche, Kiowa,<br>Plains Apache,<br>Cheyenne, Arapaho |
|                     |                  |                      | Hispanic, Euro-<br>American                                             |

Source: Blythe, 2003.

### 3.8.1.3 Cultural Resources

Cultural resources consist of the material manifestations of the knowledge, beliefs, art, morals, laws, and customs particular to a people or society. Cultural resources are divided according to two broad, temporal categories: prehistory and history. Another category, proto-history, signifies the period of transition between the two.

Prehistory is the portion of human history before the use of written records. History is that period following the introduction and use of written documents as a form of communication and preservation of knowledge. The proto-historic era refers to any period of time shared by two or more cultural groups in a specific region, in which at least one group makes use of writing. For southeast Colorado, the proto-historic period began with the exploration of the Spanish Conquistadors onto the Great Plains in 1540.

Prehistoric sites on PCMS are primarily represented by lithic scatters, open and sheltered camp sites, and architectural remnants, such as tipi rings. Historic-era properties are most commonly homesteads, family or small-scale mining operations, and both cattle and sheep ranching settlements. Hundreds of historic and multi-component archaeological sites on PCMS contain architectural ruins associated with Hispanic, Euro-, and/or Anglo-American settlers. There are no military-related historic architectural properties on PCMS. Historic properties containing architectural remnants, as well as all other elements or features that qualify a site for inclusion in the National Register, are protected and monitored in accordance with the PCMS Training PA.

Multi-component resources encompass locations that were occupied repeatedly through time,

1 creating layered deposits representing different time periods. Most multi-component sites are  
2 comprised of a historic residential occupation superimposed on one or more prehistoric  
3 occupations, a testament to universal perceptions among humans of a place's suitability for  
4 habitation.

5 At present, there are approximately 126 known historic properties that contain rock art, although  
6 the number of elements, both prehistoric and historic, number in the thousands. PCMS's rock  
7 art consists of petroglyphs (pecked, scratched, or incised) and pictographs (drawn or painted),  
8 and are generally concentrated along the length of the Hogback, in the canyons, and within the  
9 canyon plains contact. Rock art panels consist of both prehistoric and historic elements, and  
10 occur on basalt, limestone, and sandstone surfaces. A half-dozen ground-level petroglyph  
11 concentrations occur near the southern end of the PCMS, north of the Hogback, collectively  
12 referred to as "the boulder sites." Rock art sites have been documented in all of the canyons,  
13 and although the Hogback has most of the recorded sites, not all of the canyons have been  
14 intensively surveyed. There are a few known elements of rock art that appear on  
15 surfaces/outcrops on the prairie lands between the Hogback and the canyons as well. Rock art  
16 styles that have been identified on the PCMS include pecked curvilinear, pecked rectilinear,  
17 pecked representational, Purgatoire pecked, Purgatoire painted, Riogrande, plains biographic,  
18 and historic. It is noted that the vast majority of rock art elements or panels occur on identified  
19 archaeological sites, and as such are afforded the monitoring and protection strategies outlined  
20 in 3.8.1.5.

21 To date, Tribal resources of concern include the Hogback Traditional Site, which contains  
22 several sacred areas, and five other areas of traditional, religious, or cultural significance.  
23 Through government-to-government consultation with Fort Carson's culturally affiliated Tribes, a  
24 Comprehensive Agreement (CA) was developed and signed in November 2004 between Fort  
25 Carson and 10 tribes. The CA details the processes for how Fort Carson would comply with the  
26 Native American Graves Protection and Repatriation Act (NAGPRA), and grant access to Fort  
27 Carson and PCMS lands for ceremonial purposes in accordance with the American Indian  
28 Religious Freedom Act, and other laws and EOs. The CA also details the responsibilities of the  
29 parties regarding the privacy and sharing of information of Tribal interest. In May 2005, an  
30 identical CA was signed with the Jicarilla Apache Nation. At the same time, Fort Carson and the  
31 Jicarilla Apache Nation signed an MOU regarding the protection of the Hogback Traditional Site  
32 on PCMS. These consultation sessions also resulted in a report entitled "*Our Footprints are  
33 There*" *Report of Native American Consultation to Identify Traditional Cultural Properties and  
34 Sacred Sites on Lands Administered by Fort Carson, Colorado* (Blythe, 2005).

35 The Fort Carson CRMP maintains all site documentation, archival research, and artifact  
36 collections in the curation facility located on Fort Carson. Specific and detailed information  
37 regarding past and present cultural resources work and management strategies are compiled in  
38 the ICRMP, presently under revision and anticipated for signature in early 2015.

39 CRMP GIS data indicates 4,283 sites and 1,864 isolated finds (IFs) have been recorded on  
40 PCMS (Table 3.8-2). This includes 529 historic sites, 654 multi-component sites, 3,007  
41 prehistoric sites, and 93 sites of undetermined age. Of these, 504 are historic properties  
42 (officially determined to be eligible for inclusion in the NRHP), 2,729 have been determined  
43 officially not eligible for the NRHP, and 1,050 either have no official determination or require  
44 further work to determine eligibility. All of the Isolated Finds (IFs) are considered not eligible for  
45 the NRHP. Protected resources are listed in Appendix 2 of the PCMS Training PA.

**Table 3.8-2. PCMS Archaeological Sites based on 2014 GIS Data**

| Type                        | Eligible   | Not Eligible | Needs Data | No Official Determination | Total        |
|-----------------------------|------------|--------------|------------|---------------------------|--------------|
| <b>Archaeological Sites</b> |            |              |            |                           |              |
| Historic                    | 46         | 355          | 94         | 34                        | 529          |
| Multi-component             | 189        | 304          | 110        | 51                        | 654          |
| Prehistoric                 | 269        | 1,992        | 373        | 373                       | 3007         |
| Undetermined                | --         | 78           | 12         | 3                         | 93           |
| <b>Total</b>                | <b>504</b> | <b>2,729</b> | <b>589</b> | <b>461</b>                | <b>4,283</b> |

Source: PCMS GIS Cultural Resource Data, September 2014.

### 3.8.1.4 Cemeteries

There are no known cemeteries on PCMS. The Simpson Cemetery, a privately-owned, family graveyard, is located along the main entrance to PCMS, but it is not owned nor maintained by the Army.

### 3.8.1.5 Protection and Monitoring of Cultural Resources

Protection measures are required for protected properties (as defined in section 3.8.1.1). These measures have been designated as high, standard, nominal, and administrative per the PCMS Training PA.

High protection measures include the use of Seibert markers, boulders, or other barriers placed around areas that might be frequently subjected to wheeled or tracked vehicles. Any area with human remains, or suspected human remains, also requires this level of protection.

Standard protection measures use a combination of boulders, fences, Seibert markers, and/or signs in areas not protected by terrain and infrequently utilized by wheeled and tracked vehicle traffic.

Nominal protection measures include fences, Seibert markers, and/or signs in terrain-protected areas not likely to allow wheeled and tracked vehicle access, except where it is judged that the resource is better protected by maintaining the geospatial location within the Army database of record instead of physically marking the site location on the ground.

Administrative protection measures utilize access or activity restriction to protected properties. In this case, the sites are not generally marked, but can be with fences, Seibert markers, and/or signs. The PCMS Training PA notes exceptions and provides further details regarding protection measures. Notably, rescue operations and emergency response are the only exceptions to using vehicles in these areas, and reports must be made if this occurs.

Vehicles equipped with a Global Positioning System (GPS) are currently being provided digital data regarding the location of protected properties, when applicable.

In addition to protection, Fort Carson would also inspect and monitor historic properties, traditional cultural properties, and sacred sites. High frequency monitoring shall occur no less than every year at protected properties subject to high training efforts, looting or vandalism, or those suspected to contain human remains. Low frequency monitoring occurs no less than every three years where protected properties are in areas routinely used by units as tactical operations centers, support locations, assembly areas, or for other personnel and equipment

activity concentrations. Inspection would occur no less than every five years for protected properties that do not qualify for high or low frequency monitoring. Protected sites are also inspected after each brigade maneuver exercise within the operational area of the exercise.

Cultural awareness training is in place and will continue on an annual basis for all personnel involved in the execution of military training and support activities at PCMS.

### 3.8.2 ENVIRONMENTAL CONSEQUENCES

This section provides a discussion of the possible environmental impacts to cultural resources that could result from the No Action and Proposed Action alternatives. Impacts to cultural resources would be considered significant if they generate substantial concerns from Federally-recognized Native American Tribes regarding potential impacts to properties of religious and cultural significance; cause direct or indirect alteration of the characteristics that qualify a property for inclusion in the NRHP (may include physical destruction, damage, alteration, removal, change in use or character within setting, neglect causing deterioration, transfer, lease, or sale); fail to follow the stipulations in the PCMS Training PA; or adversely impact cemeteries. Table 3.8-3 provides a comparison summary of the anticipated level of impacts.

**Table 3.8-3. Summary of Cultural Resource Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            | X     |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         | X          |       |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         | X          |       |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Aviation Gunnery and Flare Training   |            | X     |          |             |            |
| Electronic Jamming Systems            | X          |       |          |             |            |
| Laser Targeting                       | X          |       |          |             |            |
| Demolitions Training                  |            | X     |          |             |            |
| UAS Training                          | X          |       |          |             |            |
| UGV Training                          | X          |       |          |             |            |
| Airspace Reclassification             | X          |       |          |             |            |
| DZ Development                        |            | X     |          |             |            |

**Table 3.8-3. Summary of Cultural Resource Impacts**

| Alternative                    | Negligible | Minor | Moderate | Significant | Beneficial |
|--------------------------------|------------|-------|----------|-------------|------------|
| Combined Elements <sup>a</sup> |            | X     |          |             |            |

a. Overall combined level of direct impact to cultural resources would be minor.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

Military training has the potential to cause significant adverse impacts to cultural resources, and there have been effects from past exercises on archaeological sites prior to their recordation or protection. However, working with the SHPO, Tribes, and stakeholders, the Army has made great strides in identifying and evaluating archaeological sites on the 219,278 acres inventoried, and in instituting the monitoring and protection measures described in 3.8.1.5. These efforts will continue as part of Fort Carson's treatment strategies and best management practices for historic properties.

### **3.8.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS**

Selecting the No Action Alternative would result in minor adverse effects to cultural resources. Under the No Action Alternative, training activities would continue under current levels as described in Section 2.2.1, Continue Existing Mission and Training Operations at PCMS. Support for and from the CRMP at PCMS would continue under the No Action Alternative along with maintaining existing environmental conditions through current operational controls. Range maintenance/upgrades and training activities would occur in accordance with existing procedures. Fort Carson would continue to manage and protect cultural resources in accordance with the PCMS Training PA and ICRMP.

### **3.8.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

#### **3.8.2.2.1 ABCT, IBCT, and SBCT Training**

BCT maneuver training, using both tracked and wheeled vehicles, is expected to occur off of designated roads and trails. This type of training has the potential to disturb surface and subsurface cultural features and/or materials, which could be crushed or displaced (horizontally and vertically) within the soil profile as vehicles cross the terrain. These vehicles also have the potential to impact historic structures, prehistoric architectural features, and rock art that may be present as well. In addition, infantry training could disturb surface and subsurface cultural features and/or deposits through the excavation of foxholes and bivouacking. Such training activities could potentially damage historic structures if training were conducted near or within those structures, could impact rock art if rock surfaces were abraded, and could disturb prehistoric architecture or other features if stones were moved or stacked. BCT training could occur within any approved location on PCMS.

The locations of all historic properties, needs data sites, no official determination sites, sacred sites, and TCPs (all of these are defined as "protected properties"), however, are marked on training digital mapping systems as "Restricted". Protective markings, including Seibert markers, signage, and boulders, as outlined in the PCMS Training PA, are placed around most resources within numbered training areas to prevent inadvertent access. All historic properties, sacred sites, and TCPs would continue to be monitored to ensure that they are not impacted by BCT training, and the procedures outlined in Section 3.8.1.5 would be adhered to for the

protection and monitoring of cultural resources. For these reasons, overall impacts to cultural resources would be negligible to minor.

Military activities associated with BCT training are included in the exemptions established in the PCMS Training PA and do not require review and evaluation under Section 106 of the NHPA. Additionally, it is Fort Carson's position that the use of Stryker vehicles for military training should also be exempted from further Section 106 consultation under the current PA, and should not be considered or treated differently than all other wheeled vehicles used for training.

The establishment of a BCT-level training intensity limit using standard maneuver area and total task miles complement the 4.7-month brigade-level training period duration would have no adverse impacts on cultural resources.

### **3.8.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

#### **3.8.2.3.1 ABCT, IBCT, and SBCT Training**

Section 3.8.2.2 discusses the potential impacts of proposed BCT training activities. As analyzed within Proposed Action Alternative 1A, brigade maneuver training and reconfiguration would result in minor impacts to cultural resources. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts from readiness training using new tactics and equipment are discussed below.

#### **3.8.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

There is the potential for adverse effects to cultural resources from the use of Aviation Gunnery (non-explosive) and Flare Training as rotary wing aircraft fire 2.75-inch rockets at temporary targets from a hover position. Existing protection measures and monitoring frequencies as described in Section 3.8.1.5 would be followed for identification and avoidance of cultural sites prior to training to minimize the potential for a rocket to have an impact on a historic property. Fort Carson's initial review of this undertaking shows that there are 28 protected properties located within the Surface Danger Zones (SDZ), and an additional 500 meter buffer for the established Area of Potential Effects (APE), for the two proposed gunnery lanes. Of these 13 are prehistoric, 7 are historic, 8 are multi-component, with 16 historic properties and 12 officially needs data. Section 106 consultation regarding this training type is required and was initiated on September 24, 2014. Consultation documentation is contained in Appendix B.

#### **3.8.2.3.3 Electronic Jamming Systems**

The use of EW technologies would not cause adverse effects to cultural resources. No ground disturbance would occur due to this training activity, and existing protection measures and monitoring frequencies described in Section 3.8.1.5 would be followed. Fort Carson has reviewed and evaluated this training type and determined that mounted and dismounted maneuver training is exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. As such, it is Fort Carson's determination that the use of electronic warfare technology in conjunction with military training has *"no potential to cause effect"* in accordance with 36 CFR 800.3(a)(1). This determination was included in the Section 106 consultation regarding this training type that was initiated on September 24, 2014. Consultation documentation is contained in Appendix B.

#### 3.8.2.3.4 Laser Targeting

It is anticipated that the use of laser designators and range finders would not cause adverse effects to cultural resources. No ground disturbance would occur due to this training activity, and Fort Carson would adhere to the existing protection measures and monitoring frequencies described in Section 3.8.1.5. Fort Carson has reviewed and evaluated this training type and determined that mounted and dismounted maneuver training, to include aerial exercises is exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. As such, Fort Carson has determined that the use of laser and range finder devices in conjunction with maneuver training has “*no potential to cause effect*” to historic properties in accordance with 36 CFR 800.3(a)(1). This determination was included in the Section 106 consultation regarding this training type that was initiated on September 24, 2014. Consultation documentation is contained in Appendix B.

#### 3.8.2.3.5 Demolitions Training

Demolitions training could potentially cause adverse impacts to cultural resources. During training, localized surface and subsurface impacts and/or deposits could occur at the point of detonation. Any surface and subsurface cultural features and/or deposits at the point of detonation could be destroyed or displaced as the blast turns up soils. In addition, ground and airborne vibrations resulting from demolitions training have the potential to adversely affect standing architecture and rock art.

Fort Carson commissioned a literature review of the potential effects of vibrations from military training on rock art at PCMS (Loubser and Lavallee, 2014). The literature review provided a starting point for the analysis of the potential effects of demolitions training on protected properties. Their review recommended a threshold of effects determination for various rock types and landform settings.

When an explosion occurs, energy is released from the site of detonation. This energy propagates through the ground as a wave, and the interaction between the wave and the ground results in vibrations, which move the ground and the structures upon it. Vibrations can be described by a particle’s displacement, velocity, and acceleration. Although displacement is the easiest concept to understand, it is rarely used in vibration discussions. Most technical documents use the term peak particle velocity [inches per second (in/sec)] to measure ground-borne vibrations from demolition activities. Although the literature review focused on vibration effects to rock art, it also used reports and studies that suggested thresholds of effects for various building types. These thresholds include both peak particle velocity and air overpressures [pounds per square inch (psi)] (Loubser and Lavallee, 2014). Air overpressures have a direct correlation to noise levels, measured in decibels (dB). It is common to use dB levels to show the range of effects that could result from airborne induced vibrations.

The Army uses the Blast Noise Impact Assessment (BNOISE2), a suite of software modeling tools, to calculate and display blast noise contours. Modeled noise contours are generated based on expected peak levels. Two of these expected noise levels are PK15 and PK50. The PK15 value is the peak sound level that should not be exceeded 85 percent of the time within any given noise event, evaluated under unfavorable weather conditions. The PK50 value is the peak sound level that should not be exceeded 50 percent of the time within any given noise event, evaluated under neutral weather conditions. Because weather conditions greatly influence how far noise travels across the landscape, as shown by the comparison of PK50 values to PK15 values, the noise contours are at approximately half the distance from the source for a given noise event.



As a starting point for the analysis and the Section 106 consultation, Fort Carson established APEs at the 119 dB noise contour. This noise contour represents the lowest noise level that could potentially effect cultural resources that contain standing architecture and/or rock art, using both the PK15 value (a distance of approximately 16,500 feet from the center of each demolition training site) and the PK50 value (a distance of approximately 8,400 feet from the center of each demolition training site). For perspective, the air overpressures created by an impulse noise at 119 dB are equivalent to a 10-15 mph wind gust, and the air pressures at 134 dB are equivalent to a 25-30 mph gust.

Section 106 consultation was initiated on September 24, 2014. Consultation documentation is contained in Appendix B. Due to the large number of sites that require field visitation, Section 106 will be accomplished in phases. It will initially address a smaller subset of sites within the 119 dB PK50 APEs, and will later follow up with the full 119 dB PK15 APEs. Additionally, Fort Carson will initiate Tribal consultation separate from the required Section 106 regarding these sites.

Within the APEs based on the PK15 values, there are 198 protected properties. None of these properties are located within the proposed footprint of the demolitions training areas. Of the 198 properties, 104 are historic properties (53 prehistoric, 4 historic, and 47 multi-component), 90 are "needs data sites" (65 prehistoric, 14 historic, and 11 multi-component), and 4 lack official determination (1 prehistoric and 3 multi-component). Of the 198 sites, 74 properties contain architectural features and/or rock art: 22 of these sites contain rock art and 47 may have some form of standing architectural features. The Cross Ranch Game Drive Site (Sacred Site for Comanche Nation, Eastern Shoshone, and Southern Ute Tribes) and Rock Crossing (Traditional Cultural Property for Southern Cheyenne Tribe and a Sacred Site for the Comanche Nation, Kiowa and Southern Arapaho Tribes) lie within the APE.

Based on the PK50 values within the APEs, there are 40 protected properties. None of these properties are located within the proposed footprint of the demolitions training areas. Of these, 28 are historic properties (15 prehistoric, 3 historic, and 10 multi-component) and 12 are "needs data sites" (6 prehistoric, 3 historic, and 3 multi-component). Of these 40 sites, there are 28 properties with architectural features, 8 of which also contain rock art. The Cross Ranch Game Drive Site and Rock Crossing exist within this subset of sites.

#### **3.8.2.3.6 UAS Training**

It is not anticipated that the increased use of UASs would cause adverse effects to cultural resources. Negligible ground disturbance would occur from this training activity and Fort Carson would adhere to the existing protection measures and monitoring frequencies described in Section 3.8.1.5. Fort Carson has reviewed and evaluated this training type and determined that aviation/aerial activities are exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. As such, it is Fort Carson's position that the use of unmanned aerial aircraft systems is included in this exemption, and should not be considered or treated differently than other aircraft used for training. This determination was included in the Section 106 consultation regarding this training type that was initiated on September 24, 2014. Consultation documentation is contained in Appendix B.

#### **3.8.2.3.7 UGV Training**

It is not anticipated that the use of UGVs would cause adverse effects to cultural resources. Negligible ground disturbance would occur from this training activity and Fort Carson would adhere to the existing protection measures and monitoring frequencies described in Section 3.8.1.5. Training with all vehicle types is exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. As such, it is Fort Carson's position that the use of

UGVs for military training should also be exempt from further Section 106 consultation under the current PA, and should not be considered or treated differently than all other wheeled vehicles used for training. This determination was included in the Section 106 consultation regarding this training type that was initiated on September 24, 2014. Consultation documentation is contained in Appendix B

#### **3.8.2.3.8 Airspace Reclassification**

The reclassification of airspace would not cause adverse effects to cultural resources.

#### **3.8.2.3.9 DZ Development**

DZ training has the potential to adversely impact cultural resources. During this type of training, the impact of Soldiers or equipment dropped could crush or damage features on archaeological sites and/or historic structures. Depending on the weight and location of the drop, subsurface deposits on archaeological sites could be disturbed. Additionally, historic structures could be damaged if a drop were to impact or land on a structure.

Both of the proposed DZs for Alternative 1B have been surveyed for archaeological resources and there are 7 protected properties within the two DZs and a 100 meter buffer established as the APE for purposes of review and evaluation. Four of these occur within the footprint of Jake DZ (3 historic properties, 1 officially needs data; 1 historic, 2 prehistoric, and 1 multi-component, none of the sites have historic structures), and 1 historic property, which is a historic site (with no historic structures) within the footprint of Sammy DZ. It is anticipated that either boulders or flexible markers will be used to protect historic properties within drop zones in order to eliminate hazards to personnel presented by fence posts.

As aviation/aerial activities are exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA, and as Fort Carson is required to identify, evaluate, protect, and monitor cultural resources in accordance with Stipulation III., *Protection of Cultural Resources*, and Stipulation IV., *Monitoring and Inspecting* of that PA, it is Fort Carson's position that the designation and use of two additional drops zones is included in exemption 1.B.2, and that no further Section 106 consultation is required. This determination was included in the Section 106 consultation regarding this training type that was initiated on September 24, 2014. Consultation documentation is contained in Appendix B.

### **3.8.3 MITIGATION MEASURES**

#### **3.8.3.1 Archaeological Sites**

Regarding training activities covered in the PCMS Training PA, all protected properties would be avoided during set-up and training activities. In addition to the monitoring stipulation described in Section 3.8.1.5, sites would also be inspected for impacts after each major training exercise per the PCMS Training PA. Any impacts noted would be assessed, included in the Training Area Clearance Plan Inspection Sheet (see Section 2.5.1.2), and Section 106 consultation initiated in accordance with 36 CFR 800.6 for resolution of adverse effects, if necessary.

For training activities in the Proposed Action Alternative that are not included in the PCMS Training PA, mitigation measures, if required, would be determined through the Section 106 consultation process.

#### **3.8.3.2 Native American Traditional Cultural Properties, Sacred Sites, and Other Properties of Traditional, Religious, and Cultural Importance**

Identified Native American TCPs, sacred sites, and other significant properties on PCMS would be avoided during set-up and training activities. In addition to the monitoring stipulation described in Section 3.8.1.5, these sites would also be inspected for impacts after each major

- 1 training exercise per the PCMS Training PA. Any impacts noted would be assessed, included in
- 2 the Training Area Clearance Plan Inspection Sheet (see Section 2.5.1.2), and government-to-
- 3 government consultation would be initiated, along with Section 106 consultation for the
- 4 resolution of adverse effects, as necessary.

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## 3.9 Socioeconomics

### 3.9.1 Affected Environment

The impacts to socioeconomics would occur in the ROI, which is defined according to local residential, shopping, and commuting patterns. The ROI for socioeconomics for the Proposed Action at PCMS comprises Huerfano, Las Animas, and Otero counties. The major communities in the vicinity of PCMS are Trinidad, in Las Animas County, and La Junta, in Otero County.

The U.S. Census Bureau transitioned to a short form decennial survey in 2010, marking a change from the long form that collected data on certain socioeconomic indicators such as low-income populations, minority populations in census tracts, housing data, and other socioeconomic indicators. That information is now collected yearly in the American Community Survey (ACS). The survey is conducted by extrapolating data from a sample population (approximately 1 to 2 percent nationwide), rather than collecting individual information from the entire population, and in turn has a higher margin of error relative to the decennial census. Data from the 2008-2012 ACS has been utilized, where appropriate, in this section to provide a current estimate of relevant data and has been noted as such. Instances for which data are based on the 2010 Census have also been noted accordingly.

#### 3.9.1.1 Population and Housing

PCMS does not support a resident population. All troops that train at PCMS are permanently stationed either at or near Fort Carson or other DoD installations. Table 3.9-1 presents population characteristics within the ROI.

**Table 3.9-1. Population within the Region of Influence**

| County            | Total Population 1990 | Total Population 2000 | Total Population 2010 | Total Population 2012 | Population Under 18, 2010 (percent) | Population Over 65, 2010 (percent) |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------------------|------------------------------------|
| Huerfano          | 6,009                 | 7,862                 | 6,711                 | 6,605                 | 17.7                                | 25.2                               |
| Las Animas        | 13,765                | 15,207                | 15,507                | 14,995                | 20.9                                | 17.7                               |
| Otero             | 20,185                | 20,311                | 18,831                | 18,790                | 24.7                                | 18.4                               |
| <b>Total ROI</b>  | <b>39,959</b>         | <b>43,380</b>         | <b>41,049</b>         | <b>40,431</b>         | <b>22.1</b>                         | <b>19.2</b>                        |
| State of Colorado | 3,294,394             | 4,301,261             | 5,029,196             | 5,189,458             | 24.4                                | 10.9                               |

Sources: U.S. Census 2000; U.S. Census 2010; U.S. Census 2013.

ROI=Region of Influence

Population in the ROI increased between 1990 and 2000 at a rate of 8.6 percent, but decreased by 5.4 percent between 2000 and 2010, as shown in Table 3.9-1 (U.S. Census, 1990; U.S. Census, 2000). Based on most recent 2013 Population Estimates data, the population is continuing to decrease in the ROI, with a decrease of approximately 1.5 percent since 2010 (U.S. Census, 2013). Each of the three counties in the ROI is characterized by a population concentration in one or two cities that accounts for a large percentage of the county population. According to the 2010 Census, Walsenburg, in Huerfano County, has 46 percent of the county population; Trinidad, in Las Animas County, has 59 percent of the county population; and La Junta and Rocky Ford, in Otero County, together have 59 percent of the county population (U.S. Census, 2010).

There is no permanent military housing at PCMS. Family housing and barracks for personnel training at PCMS are located at Fort Carson. Housing characteristics within the ROI are detailed in Table 3.9-2.

**Table 3.9-2. Housing Characteristics within the Region of Influence<sup>a</sup>**

|                                               | County   |            |        | State of Colorado |
|-----------------------------------------------|----------|------------|--------|-------------------|
|                                               | Huerfano | Las Animas | Otero  |                   |
| <b>Total Housing Units</b>                    | 5,074    | 8,206      | 8,960  | 2,211,615         |
| <b>Vacant Housing Units</b>                   | 1,940    | 2,045      | 1,321  | 248,862           |
| <b>Homeowner Vacancy Rate</b>                 | 5.3      | 4.7        | 3.2    | 2.2               |
| <b>Rental Vacancy Rate</b>                    | 7.9      | 10.7       | 11.4   | 6.5               |
| <b>Owner-occupied Housing Units (percent)</b> | 74.3     | 70.7       | 63.1   | 65.9              |
| <b>Median Monthly Rent Value (\$)</b>         | 676      | 699        | 591    | 915               |
| <b>Median Home Value (\$)</b>                 | 159,100  | 143,200    | 90,900 | 236,800           |
| <b>Median Household Income (\$)</b>           | 32,754   | 41,623     | 31,860 | 58,244            |

Sources: U.S. Census, 2012a; U.S. Census, 2012c.

a. Numbers are based on most recent available 2008-2012 ACS surveys.

ACS=American Community Survey

Between 75 and 80 percent of housing units in the ROI are single-family units, and few structures contain 10 or more units. Mobile homes comprise between 7 and 11 percent of the housing units. The housing stock is relatively old, as over 30 percent of homes were constructed prior to 1939. The proportion of units lacking complete plumbing and kitchen facilities (a surrogate measure for quality) is low (less than 1 percent) in Otero County and Las Animas County, but rises to 4 percent in Huerfano County (U.S. Census, 2012a). Huerfano County has a high number of seasonal, recreational, and occasional-use homes.

### 3.9.1.2 Environmental Justice and Protection of Children

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. *Environmental Justice: Guidance Under the National Environmental Policy Act* (CEQ, 1997) defines minorities as members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black or African American, and Hispanic<sup>1</sup>. A minority population should be identified when the minority population of the affected area exceeds 50 percent or when it is meaningfully greater than the minority population percentage in the general population.

Low-income populations are identified using the U.S. Census Bureau's statistical poverty threshold, which varies by household size and the number of children. The U.S. Census Bureau defines a poverty area as a census tract where 20 percent or more of the residents have incomes below the poverty threshold; an extreme poverty area has 40 percent or more of the residents below the poverty level (U.S. Census, 1995). Table 3.9-3 presents minority and low-income populations in the ROI.

<sup>1</sup> Persons of Hispanic or Latino origin may be members of any racial group.

**Table 3.9-3. Minority and Low-Income Population in the ROI**

| County            | Minority Population <sup>a</sup> (percent) | Low-Income Population (percent) |
|-------------------|--------------------------------------------|---------------------------------|
| Huerfano          | 46.9                                       | 20.8                            |
| Las Animas        | 46.5                                       | 18.6                            |
| Otero             | 44.6                                       | 24.8                            |
| State of Colorado | 30.0                                       | 12.9                            |
| United States     | 36.3                                       | 14.9                            |

Sources: U.S. Census, 2012b; U.S. Census, 2012c.

a. Minority populations are classified as those populations other than white-only populations that are also non-Hispanic.

The members of the minority population in the ROI are mostly of Hispanic origin. Specifically, Hispanics represent 35.5 percent of the minority population in Huerfano County, 42 percent in Las Animas County, and 40.4 percent in Otero County (U.S. Census, 2012b).

Minority populations in Census Tract 8 in Las Animas County and Census Tract 9684 in Otero County (i.e., the Census tracts directly adjacent to PCMS) comprise approximately 33 percent and 45.8 percent of minority populations in their tracts, respectively, and do not have disproportionately high minority populations. Low-income populations are present in Census Tract 9684 in Otero County (i.e., 30.4 percent) based on the threshold for a poverty area. Census Tract 8 in Las Animas County has a poverty rate lower than the percentage for Las Animas County (i.e., 10.5 percent) (U.S. Census, 2012c). Some additional census tracts in all three counties, which are farther away from PCMS, have minority and low-income populations at greater percentages than the county, state, and U.S. average.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, seeks to protect children from environmental health or safety risks that might arise as a result of government policies, programs, activities, and standards. No children live on PCMS, and PCMS is secured to prevent trespassing. There are few residences immediately adjacent to PCMS.

### 3.9.1.3 Community Services

The ROI contains 14 school districts, with a total combined student population of approximately 6,300 in 2012 (State of Colorado, 2012). The student-to-teacher ratio varies among school districts and across counties, and is approximately 12:1 in Huerfano County, 15:1 in Las Animas County, and 18:1 in Otero County, as of 2012.

Huerfano County is served by the Huerfano County Sheriff's Office and the Walsenburg Police Department. Las Animas County is served by the Las Animas County Sheriff's Office and the Trinidad Police Department. Otero County is served by the Otero County Sheriff's Office and the Fowler, La Junta, and Rocky Ford police departments (USA Cops, 2013). In 2012, Huerfano County was served by 12 sworn officers; Las Animas County was served by 14 sworn officers; and Otero County was served by 9 sworn officers (FBI, 2012).

The ROI is served by 15 fire departments, including three departments in Huerfano County, eight departments in Las Animas County, and four departments in Otero County. These departments collectively have 27 fire stations throughout the ROI (USFA, 2012). Fort Carson also has an on-post fire department that serves PCMS and maintains multiple mutual aid

1 agreements for fire protection at PCMS with approximately 33 fire departments in the region  
2 (Department of the Army, undated).

3 Each county in the ROI is served by one hospital, including the Spanish Peaks Regional Health  
4 Center in Walsenburg, Huerfano County; Mt. San Rafael Hospital in Trinidad, Las Animas  
5 County; and Arkansas Valley Regional Medical Center in La Junta, Otero County (CDPHE,  
6 2013). Emergency medical services are provided through multiple ambulatory services based  
7 out of La Junta, Rocky Ford, Fowler, and Trinidad. Ambulatory services are also provided by Mt.  
8 San Rafael Hospital, MedTrans, and Spanish Peaks Regional Health Center. Emergency  
9 medical services are believed to be adequate for the level of need in the ROI (Otero County,  
10 2014).

11 The Colorado Division of Homeland Security and Emergency Management provides local  
12 governments support before, during, and after disaster events to enhance preparedness. It also  
13 devotes available resources toward prevention, protection, mitigation, response, and recovery.  
14 County governments have a designated emergency management contact within local law  
15 enforcement or the applicable emergency management office that oversees local emergency  
16 response (CDHSEM, 2014).

#### 17 **3.9.1.4 Economic Development and Employment**

18 Characteristics of economic development include employment and its distribution across  
19 industrial sectors, unemployment, earnings, sources of income, and contributions to the regional  
20 economy by military installations, their personnel, and retired service members. Table 3.9-4  
21 displays select economic characteristics in the ROI.

22 Total wages in the ROI were approximately \$570 million in 2012. The majority of wages were  
23 contributed by Otero County (45 percent) and Las Animas County (43 percent). Government  
24 services, healthcare, and social assistance were the largest contributing sectors to total wages  
25 in all counties in the ROI. Government and government enterprises contribute the highest  
26 portion of jobs within the ROI. Some employment numbers are omitted from calculations for  
27 confidentiality purposes, although it is assumed that employment figures are comparable to  
28 reported earnings data, if available. As such, it is assumed that healthcare and social assistance  
29 is also a major employment sector in the region. Other major employment sectors include retail  
30 trade arts, and accommodation and food services. Ranching and agricultural activities occur  
31 near the borders of PCMS, and prior to acquisition, the lands on which PCMS is now located  
32 were used for ranching (see Section 3.2, Land Use). Tourism is also a contributing economic  
33 sector particularly in and around PCMS. The counties in the ROI are primarily rural in character  
34 aside from the main population centers.

35 Unemployment is uncharacteristically high compared to historic numbers as a result of the  
36 economic downturn that began in 2008 (see Table 3.9-4). In 2007, annual unemployment rates  
37 in the ROI were 4.8 percent in Huerfano County; 3.7 percent in Las Animas County; 5 percent in  
38 Otero County; and 3.8 percent in the State of Colorado (BLS, 2014).



1 **Table 3.9-4. Employment and Compensation by Industry in ROI**

| Industry                                         | Compensation (Thousands of Dollars) |                |                |                         | Employment   |              |              |                      |
|--------------------------------------------------|-------------------------------------|----------------|----------------|-------------------------|--------------|--------------|--------------|----------------------|
|                                                  | Huerfano                            | Las Animas     | Otero          | Colorado                | Huerfano     | Las Animas   | Otero        | Colorado             |
| Mining                                           | (D)                                 | 28,320         | (D)            | 2,744,366 <sup>a</sup>  | (D)          | 402          | (D)          | 33,896 <sup>a</sup>  |
| Utilities                                        | (D)                                 | 1,914          | 6,872          | 794,891 <sup>a</sup>    | (D)          | 23           | 87           | 5,572 <sup>a</sup>   |
| Construction                                     | 1,659                               | 14,728         | 4,286          | 989,075 <sup>a</sup>    | 178          | 491          | 290          | 31,789 <sup>a</sup>  |
| Manufacturing                                    | 2,844                               | 3,476          | 23,083         | 10,532,457              | 101          | 126          | 532          | 145,472              |
| Wholesale trade                                  | 1,822                               | 5,959          | 9,209          | 8,152,436               | 69           | 129          | 299          | 97,281 <sup>a</sup>  |
| Retail trade                                     | 6,529                               | 18,710         | 20,368         | 1,119,295 <sup>a</sup>  | 344          | 790          | 983          | 43,428 <sup>a</sup>  |
| Transportation and warehousing                   | 1,116                               | 19,806         | 17,930         | 3,903,268               | (D)          | 281          | 372          | 71,378 <sup>a</sup>  |
| Information                                      | 1,026                               | 1,507          | 3,883          | 7,577,825               | 76           | 53           | 125          | 82,283               |
| Finance and insurance                            | 1,302                               | 8,637          | 10,533         | 10,031,375              | 108          | 434          | 409          | 188,662 <sup>a</sup> |
| Real estate and rental and leasing               | 229                                 | 3,815          | 1,985          | 2,409,658               | 238          | 336          | 316          | 183,427              |
| Professional, scientific, and technical services | 1,798                               | 5,295          | 2,926          | 519,029 <sup>a</sup>    | 131          | 215          | 229          | (D)                  |
| Management of companies and enterprises          | (D)                                 | (D)            | 268            | 5,549,533 <sup>a</sup>  | (D)          | (D)          | 10           | 32,826 <sup>a</sup>  |
| Administrative and waste management services     | (D)                                 | 1,903          | 2,432          | 6,011,760 <sup>a</sup>  | (D)          | (D)          | 276          | 178,187 <sup>a</sup> |
| Educational services                             | (D)                                 | 1,706          | (D)            | 1,879,726               | (D)          | 86           | (D)          | 57,064 <sup>a</sup>  |
| Health care and social assistance                | 4,318                               | 30,157         | 34,112         | 12,868,867 <sup>a</sup> | (D)          | 746          | (D)          | 263,832 <sup>a</sup> |
| Arts, entertainment, and recreation              | (D)                                 | 600            | 370            | 453,093 <sup>a</sup>    | (D)          | 112          | 106          | 18,353 <sup>a</sup>  |
| Accommodation and food services                  | 2,646                               | 10,113         | 8,183          | 1,117,481 <sup>a</sup>  | (D)          | 656          | 580          | 44,167 <sup>a</sup>  |
| Other services, except public administration     | 3,084                               | 9,049          | 9,442          | 509,567 <sup>a</sup>    | 180          | 565          | 496          | 24,080 <sup>a</sup>  |
| Government and government enterprises            | 20,557                              | 76,736         | 79,828         | 29,434,652              | 495          | 1,777        | 1,868        | 455,859              |
| <b>Total, Nonfarm</b>                            | <b>67,552</b>                       | <b>243,972</b> | <b>258,057</b> | <b>151,210,678</b>      | <b>3,072</b> | <b>8,081</b> | <b>8,735</b> | <b>3,235,121</b>     |
| Farm                                             | 1,167                               | 2,383          | 5,310          | 417,306                 | 315          | 570          | 690          | 43,820               |
| <b>Percent Unemployed</b>                        | --                                  | --             | --             | --                      | 11.3         | 9.1          | 8.8          | 6.6                  |

2 Sources: BEA, 2012a; BEA, 2012b.

3 a. Individual counts omit some confidential information, but estimates included in totals.

4 (D)=Data omitted in Bureau of Economic Analysis database to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Major employers in Las Animas County include Trinidad State Junior College, oil and gas drilling enterprises, and related support businesses. A steel parts manufacturer is a major employee in Otero County. The economy of Otero County is closely linked to agriculture, including livestock (primarily cattle) production and farming. Major crops include dry land wheat, irrigated corn, and alfalfa hay. Huerfano County has a large, medium-security correctional facility that provides employment in the area.

Little permanent employment is directly associated with PCMS. The majority of supplies needed for training activities at PCMS are assembled at Fort Carson and transported to PCMS with the troops. No other military installations exist within the ROI, and only limited contracts are awarded to businesses in the ROI. There is command emphasis on sending small groups of Soldiers to surrounding communities for meals and to purchase supplies from local businesses when Soldiers are staying overnight at PCMS.

The main sources of revenue for counties in the ROI are intergovernmental transfers (i.e., funds from state and Federal government) and property taxes. Intergovernmental transfers accounted for approximately 46 percent of revenue in Huerfano County, 60 percent of revenue in Las Animas County, and 73 percent of revenue in Otero County in 2010. The major operating expenditure categories for the counties are social services, public works, and public safety. The provision of social services consumes about 26 percent of operating expenditures in Huerfano County, 43 percent in Las Animas County, and up to 63 percent in Otero County (State of Colorado, 2010).

### **3.9.2 Environmental Consequences**

This section provides a discussion of the environmental impacts to the socioeconomic environment or minority and low-income populations that would result from the No Action and the Proposed Action alternatives. A significant impact would occur if an alternative caused: substantial change to the sales volume, income, employment, or population of the surrounding ROI; disproportionate adverse economic, social, or health impacts on minority or low-income populations; long-term substantial loss or displacement of recreational opportunities and resources relative to baseline; substantial disproportionate health or safety risk to children; substantial increased public safety hazard from military operations; or a substantial increase in demand for public services (e.g., fire protection, police enforcement, education, etc.). Table 3.9-5 provides a comparison summary of anticipated level of impacts. In accordance with FAA Order 1050.1E, CHG 1 secondary (induced) impacts<sup>2</sup> are considered in this impact analysis.

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<sup>2</sup> Secondary impacts include indirect or induced impacts caused by major development proposals, such as shifts in patterns of population movement and growth; public service demands; or changes in business and economic activity to the extent influenced by the development. Induced impacts are typically not significant except where there are also significant impacts in other categories, especially noise, land use, or direct social impacts.

**Table 3.9-5. Summary of Socioeconomics Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      | X          |       |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         | X          |       |          |             |            |
| IBCT Training                         | X          |       |          |             |            |
| SBCT Training                         | X          |       |          |             |            |
| Combined Elements <sup>a</sup>        | X          |       |          |             |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         | X          |       |          |             |            |
| IBCT Training                         | X          |       |          |             |            |
| SBCT Training                         | X          |       |          |             |            |
| Aviation Gunnery and Flare Training   | X          |       |          |             |            |
| Electronic Jamming Systems            | X          |       |          |             |            |
| Laser Targeting                       | X          |       |          |             |            |
| Demolitions Training                  | X          |       |          |             |            |
| UAS Training                          | X          |       |          |             |            |
| UGV Training                          | X          |       |          |             |            |
| Airspace Reclassification             | X          |       |          |             |            |
| DZ Development                        | X          |       |          |             |            |
| Combined Elements <sup>a</sup>        | X          |       |          |             |            |

a. Overall combined level of direct impact to socioeconomics would be negligible.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.9.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Under the No Action Alternative, there would be no changes to training levels or operations currently occurring at PCMS as described in Section 2.2.1, Continue Existing Mission and Training Operations at PCMS. As previously noted, almost all the supplies needed for the training activities that take place at PCMS are assembled at Fort Carson and transported to PCMS with troops. Permanent housing for troops that train at PCMS is provided at Fort Carson. Impacts to the socioeconomic environment or minority and low-income populations would be negligible.

### **3.9.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

There would be a slight increase in economic activity under Alternative 1A, as Soldiers within the ABCT, IBCT, and SBCT that would train at PCMS would have the opportunity to leave the Installation to purchase meals and supplies in local communities. This would result in negligible beneficial impacts.

Training activities could result in the increased need for fire and emergency services, specifically from the increased possibility of wildfires from training activities. Existing service levels, both on-post and through mutual aid agreements, are anticipated to be sufficient to satisfy any increased needs for fire and emergency services as a result of Alternative 1A; therefore, no impacts to community services are anticipated.

Training activities could be a nuisance for those living near the installation border; however, it is not anticipated to result in disproportionately adverse impacts to low-income and minority communities.

No adverse effects to the protection of children would occur. No children live on PCMS, and the residential population in the adjacent area is low. Existing security measures that prevent trespassing on PCMS would prevent children from coming on-post.

There would be no major population shifts or growth, substantial increases in public service demands, or changes in business and economic activity to the extent influenced by the Alternative 1A, nor would there be secondary or induced impacts.

The establishment of a BCT-level training intensity limit using SMAs and Task Order Miles to complement the 4.7-month brigade-level training period duration would have no adverse impacts on socioeconomic conditions.

### **3.9.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

Section 3.9.2.2 discusses potential impacts regarding proposed BCT training activities to socioeconomic resources from brigade maneuver training. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Proposed Action Alternative 1B would not affect socioeconomic factors beyond those discussed above in Section 3.9.2.2. Impacts would be negligible.

### **3.9.3 Mitigation Measures**

No significant adverse impacts would be expected as a result of the Proposed Action Alternatives; impacts would be negligible. Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future.

## 3.10 Traffic and Transportation

### 3.10.1 Affected Environment

#### 3.10.1.1 Regional Transportation

Transportation near PCMS is limited. Interstate (I)-25, U.S. Route 160C (160C), and U.S. Route 350A (350A) provide access to the PCMS gate. The sole access point to PCMS is approximately 30 miles northeast of Trinidad. I-25 is the primary north-south interstate highway through Colorado, and the City of Pueblo, located approximately 30 miles south of Fort Carson, is the only city transected by the I-25 portion of the route to PCMS.

##### 3.10.1.1.1 PCMS Convoys

Fort Carson transports equipment and supplies to PCMS on roadways via a designated route (Figure 3.10-1). This route is generally limited to wheeled vehicles, although large trucks could transport a limited number of track vehicles (e.g., M1 Abrams) during brigade-level training events in accordance with CDOT requirements. Vehicles transported on public roadways are within the CDOT width restrictions of 15 feet for I-25, 160C, and 350A. Although roadways can support the convoy traffic, to reduce traffic conflicts, movements are scheduled to avoid peak traffic periods in the Pueblo metropolitan area.

The average annual daily traffic (AADT) is the average number of vehicles traveling along a roadway each day. Level of Service (LOS) is a measure of the operational conditions on a roadway or at an intersection. LOS range from A to F, with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays). LOS A, B, or C are typically considered good operating conditions. Table 3.10-1 outlines the major roadways of the convoy route, their AADT, and their estimated existing LOS. Notably, most of these roadways do not currently get congested during peak traffic periods (i.e., LOS D, E, or F).

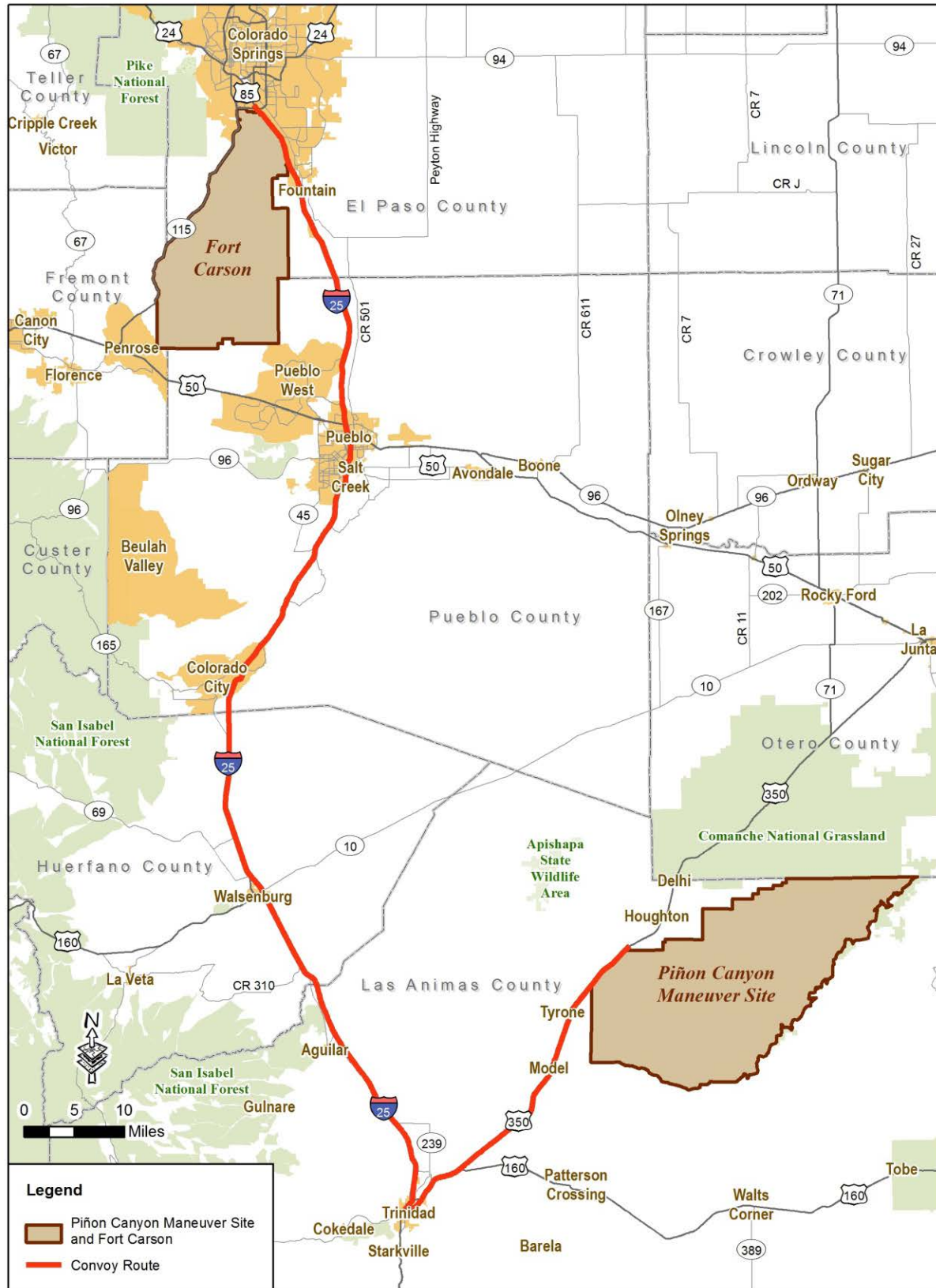
**Table 3.10-1. Existing AADT and LOS on Nearby Roadways**

| Roadway                 | AADT<br>[vpd] | One-Way Peak<br>Hour Volume<br>[vph] | Volume to<br>Capacity Ratio | Estimated<br>Existing LOS |
|-------------------------|---------------|--------------------------------------|-----------------------------|---------------------------|
| I-25 (near Fort Carson) | 84,000        | 2,100                                | 1.23                        | F                         |
| I-25 (near PCMS)        | 11,000        | 594                                  | 0.35                        | C                         |
| 160C                    | 3,000         | 324                                  | 0.19                        | B                         |
| 350A                    | 520           | 56                                   | 0.03                        | A                         |

Sources: CDOT, 2014; ITE, 2003.

AADT=average annual daily traffic; LOS=level of service; vpd=vehicles per day; vph=vehicles per hour

Figure 3.10-2 shows the existing road network within PCMS. The roadway network at PCMS is divided into three categories: cantonment area roads, MSR's, and secondary roads in the training areas. Each roadway category serves a specific function in moving personnel and freight to and from the PCMS cantonment area.



**Figure 3.10-1. Convoy Route from Fort Carson to PCMS**



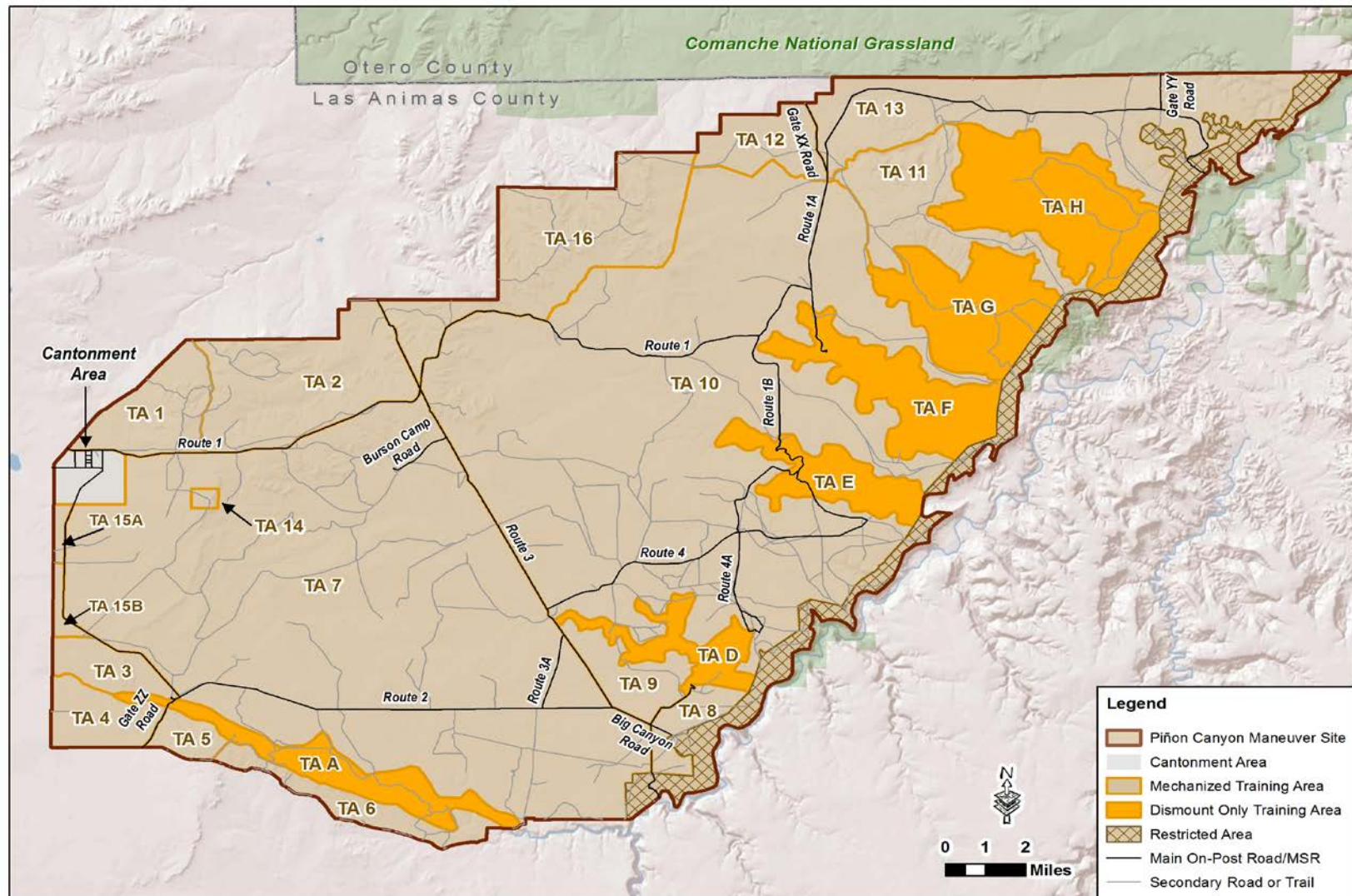


Figure 3.10-2. Existing PCMS Road Network

Roads move people and freight within the cantonment area and funnel them onto the MSRs. The cantonment area roads provide a direct connection between the off-post deployment route and the MSRs. The MSRs move the Soldiers' equipment and supplies throughout PCMS. Secondary roads provide access between the MSRs and adjacent training areas, as well as move vehicle traffic through the training areas (DPW, 2006). With the exception of one mile of paved road in the cantonment area, the roadway network at PCMS is unpaved. There are approximately 107 miles of MSRs and 490 miles of secondary roads on PCMS (DPW, 2006).

Traffic volumes on the PCMS road network vary widely between training deployment and nondeployment periods. During nondeployment periods, traffic on PCMS is limited to a small number of maintenance and administrative vehicles, and thus fewer than 25 vehicles per day travel on the main entrance road. During deployments to PCMS, daily vehicle traffic entering the cantonment area increases by approximately 350 or more vehicles per day for approximately three days. During the training rotation, administrative and service support traffic remains slightly increased. At the completion of training and the departure of the unit vehicles, traffic entering PCMS returns to an AADT of 25 vehicles per day (DPW, 2006).

During an ABCT rotation, as many as 1,300 additional vehicles would use the on-post road network. This includes all vehicles involved in training, including those that arrive via the off-post roadway network and the rail. The volume of traffic on a given section of road, with the exception of the main entrance road into PCMS, varies because it is contingent on the nature of the maneuver training and variations of the training mission requirements (DPW, 2006).

#### **3.10.1.1.2 Other Transportation**

The closest airport is Piñon Canyon Airport (0CD5), which is on PCMS. The closest international airport is Denver International, approximately 160 miles north, which supports 1,738 operations per day. Other nearby airports include Perry Stokes Airport and Spanish Peaks Airfield (AirNav, 2014). The closest Amtrak train station is approximately 30 miles away at Trinidad Station (Amtrak, 2014). There is no public transportation servicing PCMS; however, private charter buses are used for transporting some Soldiers during brigade-level training events.

PCMS has six active rail spurs with docks with railhead capacity to receive and unload 165 rail cars. Equipment and supplies transported by rail enter the site adjacent to the vehicle marshalling area. Co-location of the marshalling area and rail spurs provides an effective way of managing vehicles that are transported by rail. A typical brigade-level training activity at PCMS requires four train shipments to PCMS, once per day for four days, consisting of 225 to 230 cars. All vehicles shipped by train are shipped back to Fort Carson at the conclusion of the training rotation. Rail shipments between PCMS and Fort Carson do not exceed one shipment per day for a total of no more than 40 days in any given year. Sufficient rail capacity is available to accommodate this shipment schedule. Rail convoy movements are normally scheduled through the Installation Transportation Officer 60 days in advance.

#### **3.10.2 Environmental Consequences**

This section provides a discussion of the potential environmental impacts to transportation resources that would result from the No Action and the Proposed Action alternatives. Impacts were primarily assessed by reviewing existing traffic conditions of public roadways and the types and frequency of activities that may require use of these roadways. Impacts to traffic and transportation would be considered significant if the action results in a reduction by more than two LOSs at roads and intersections within the ROI. Table 3.10-2 provides a comparison summary of anticipated level of impacts.



**Table 3.10-2. Summary of Traffic and Transportation Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            | X     |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Aviation Gunnery and Flare Training   | X          |       |          |             |            |
| Electronic Jamming Systems            | X          |       |          |             |            |
| Laser Targeting                       | X          |       |          |             |            |
| Demolitions Training                  | X          |       |          |             |            |
| UAS Training                          | X          |       |          |             |            |
| UGV Training                          | X          |       |          |             |            |
| Airspace Reclassification             | X          |       |          |             |            |
| DZ Development                        | X          |       |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |

a. Overall combined level of direct impact to traffic and transportation would be minor, BCT convoys would be intermittent and would not occur simultaneously (i.e., no more than one BCT at a time).

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.10.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Selecting the No Action Alternative would result in minor impacts to traffic and transportation. This alternative involves continuing existing training missions at PCMS, as described in Section 2.2.1, Continue Existing Mission and Training Operations at PCMS, and maintaining existing environmental conditions through current operational controls. Range maintenance, upgrade, and training activities would occur in accordance with existing procedures. Because the number and type of activities would remain relatively constant under the No Action Alternative, Fort Carson would continue its current use of roadways and rail for the delivery of training operations

equipment and supplies to PCMS. Traffic and transportation resources would remain unchanged when compared to existing conditions.

### 3.10.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement

Long-term minor adverse effects would be expected. There would be no appreciable short-term effects to traffic or transportation resources from Proposed Action Alternative 1A. Long-term effects would primarily result from increased roadway and rail traffic due to the transport of equipment and supplies during ABCT, IBCT, and SBCT training at PCMS. Effects would be minor, because although these activities would create a slight increase in traffic, the increase would not be great enough to appreciably impact traffic and transportation.

The establishment of a BCT-level training intensity limit using SMAs and Total Task Miles to complement the 4.7-month brigade-level training period duration would have no adverse impacts to traffic and transportation.

#### 3.10.2.2.1 ABCT Training

Long-term minor adverse effects would be expected. The delivery of the ABCT equipment and supplies would have minor effects due to increases in traffic during convoys to and from PCMS. The total number of brigade-level training events would not change. In addition, due to the conversion of an ABCT into an SBCT, the total number of future ABCT training events would be replaced on a one-to-one basis with proposed SBCT exercises.

#### PCMS Convoys and Off-Post Traffic

Table 3.10-3 provides a comparison of the existing wheeled and tracked vehicles by brigade to be deployed to PCMS. Vehicles would be delivered to PCMS by the existing convoy route or by rail. The total number of wheeled vehicles would increase slightly under the Alternative 1A, and additional trailers or trucks may be required to transport some tracked vehicles during convoys. This would result in a slight increase in hourly traffic volumes when compared with existing conditions. Typically, convoys are broken into groups of approximately 25 vehicles each, in which each vehicle travels approximately 15 feet away from the next vehicle. Additional convoys could be required to travel to PCMS during ABCT training.

**Table 3.10-3. Estimated Number of Vehicles by Brigade**

| Vehicles per Brigade |       |      |                  |       |      |       |
|----------------------|-------|------|------------------|-------|------|-------|
| Existing/No-Action   |       |      | Proposed         |       |      |       |
| Type                 | ABCT  | IBCT | Type             | ABCT  | IBCT | SBCT  |
| Wheeled Vehicles     | 824   | 700  | Wheeled Vehicles | 824   | 785  | 1,184 |
| Tracked Vehicles     | 333   | 0    | Tracked Vehicles | 394   | 0    | 0     |
| Total Vehicles       | 1,157 | 700  | Total Vehicles   | 1,218 | 785  | 1,184 |

Source: URS, 2008.

ABCT=Armor Brigade Combat Team; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team

Table 3.10-4 provides a comparison of the LOS both with and without the Alternative 1A, and the estimated percent of hourly traffic increase during ABCT convoy movements. Daily traffic volumes along I-25 would experience a temporary increase of less than one percent. Daily traffic volumes during training convoys along 160C and 350A would experience increases up to

2 percent and 10 percent, respectively. Increased traffic volumes would occur intermittently for approximately 30 days per year under maximum training conditions for all combined brigade-level training events. These sporadic increases in traffic are not expected to dramatically reduce the LOS of any roadway segment along the convoy route. In addition, convoys would be timed to avoid peak traffic periods along I-25 through Pueblo and would not contribute to traffic delays in that area.

**Table 3.10-4. LOS and Percent Increase in Traffic During ABCT Convoys**

| Roadway                 | Estimated Existing LOS | Estimated LOS During Existing ABCT Convoy | Estimated Increase from Existing ABCT Convoy | Estimated LOS During Proposed ABCT Convoy | Estimated Increase from Proposed ABCT Convoy |
|-------------------------|------------------------|-------------------------------------------|----------------------------------------------|-------------------------------------------|----------------------------------------------|
| I-25 (near Fort Carson) | F                      | F                                         | 0.1%                                         | F                                         | 0.1%                                         |
| I-25 (near PCMS)        | C                      | C                                         | 0.4%                                         | C                                         | 0.5%                                         |
| 160C                    | B                      | C                                         | 1.6%                                         | C                                         | 1.7%                                         |
| 350A                    | A                      | A                                         | 9.3%                                         | A                                         | 9.8%                                         |

Sources: CDOT, 2014; URS, 2008.

ABCT=Armor Brigade Combat Team; LOS=level of service

#### **On-Post Traffic**

Traffic volumes on Fort Carson or PCMS during times without training deployments would not change from existing conditions. As with existing ABCT training rotations at PCMS, all deployed vehicles would be routed through the PCMS cantonment area, and would disperse as their mission required. Increased traffic levels from the proposed ABCT expansion would not hinder training exercises or result in traffic capacity constraints at PCMS.

#### **Other Transportation**

Alternative 1A would incrementally increase the frequency of rail shipments from Fort Carson to PCMS during an ABCT training exercise. Due to the conversion of an ABCT to an SBCT, however, the total number of future ABCT training events would likely be replaced on a one-to-one basis with the proposed SBCT. Because an SBCT has substantially fewer tracked vehicles than an ABCT and the Stryker vehicles are expected to be shipped by rail, the overall annual rail shipments to and from PCMS would decrease. These effects would be negligible.

There would be an increased use of private charter buses used for transporting Soldiers to PCMS during ABCT training events when compared to existing conditions. These effects would be negligible.

#### **3.10.2.2.2 IBCT Training**

Long-term minor adverse effects would be expected. The delivery of the IBCT equipment and supplies would have minor effects due to increases in traffic during convoys to and from PCMS. The addition of an annual IBCT-level training event would not hinder off-post traffic conditions, training exercises, or result in traffic capacity constraints at PCMS. The frequency of these events would be sporadic.

### PCMS Convoys and Off-Post Traffic

Table 3.10-5 provides a comparison of the LOS both with and without Alternative 1A, and the estimated percent of hourly traffic increase during proposed IBCT convoy movements. Daily traffic volumes along I-25 would experience a temporary increase of less than 1 percent. Daily traffic volumes during training convoys along 160C and 350A would experience increases up to 1 percent and 6 percent, respectively. These changes would be indistinguishable from existing conditions. Increased traffic volumes would occur intermittently for approximately 30 days per year under maximum training conditions for all brigade-level training events combined. These sporadic increases in traffic are not expected to dramatically reduce the LOS of any roadway segment along the convoy route when compared to existing conditions. In addition, convoys would be timed to avoid peak traffic periods along I-25 through Pueblo and would not contribute to traffic delays in that area.

**Table 3.10-5. LOS and Percent Increase in Traffic During IBCT Convoys**

| Roadway                 | Estimated Existing LOS | IBCT Estimated Existing LOS | IBCT Estimated Percent of Increase from Existing Convoy (hourly) | IBCT Estimated Proposed Action LOS | IBCT Estimated Percent of Increase from Proposed Action Convoy (hourly) |
|-------------------------|------------------------|-----------------------------|------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------|
| I-25 (near Fort Carson) | F                      | F                           | 0.1%                                                             | F                                  | 0.1%                                                                    |
| I-25 (near PCMS)        | C                      | C                           | 0.3%                                                             | C                                  | 0.3%                                                                    |
| 160C                    | B                      | C                           | 1.0%                                                             | C                                  | 1.1%                                                                    |
| 350A                    | A                      | A                           | 5.6%                                                             | A                                  | 6.3%                                                                    |

Sources: CDOT, 2014; URS, 2008.

IBCT=Infantry Brigade Combat Team; LOS=level of service

### On-Post Traffic

Traffic volumes on Fort Carson or PCMS occurring during times without IBCT training deployments would not change from existing conditions. All deployed vehicles would be routed through the PCMS cantonment area and would disperse as their mission requires. Increased traffic levels from the proposed IBCT training would not hinder training exercises or result in traffic capacity constraints at PCMS.

### Other Transportation

IBCTs would have no tracked vehicles with or without Alternative 1A, and the overall annual rail shipments to and from PCMS associated with IBCT training would remain approximately the same when compared to existing conditions. These effects would be negligible.

There would be an increased use of private charter buses used for transporting Soldiers to PCMS during IBCT training events. These effects would be minor.

#### 3.10.2.2.3 SBCT Training

Long-term minor adverse effects would be expected. The delivery of SBCT training equipment and supplies would have minor effects due to increases in traffic during convoys to and from PCMS. The total number of brigade-level training events would not change, and as with existing conditions, the frequency of these events would be sporadic. In addition, due to the conversion of an ABCT to an SBCT the total number of future ABCT training events would likely be replaced on a one-to-one basis with proposed SBCT exercises.

### PCMS Convoys and Off-Post Traffic

It is possible, although unlikely, that Stryker vehicles would drive to PCMS in the convoy. However, it is more likely that Strykers would be transported by rail. Table 3.10-6 provides a comparison of the LOS both with and without Alternative 1A if the Strykers were to drive to PCMS, and the estimated percent of hourly traffic increase during SBCT convoy movements. As with existing ABCT convoys, daily traffic volumes along I-25 would experience a temporary increase of less than 1 percent. Daily traffic volumes during training convoys along 160C and 350A would experience increases up to 2 percent and 10 percent, respectively. These sporadic increases in traffic are not expected to change the LOS of any roadway segment along the convoy route. In addition, convoys would be timed to avoid peak traffic periods along I-25 through Pueblo, and would not contribute to traffic delays in that area. Strykers would maintain oversized vehicle permits when driven on public roadways.

**Table 3.10-6. LOS and Percent Increase in Traffic During SBCT Convoys**

| Roadway                 | Estimated Existing LOS | Estimated LOS During Existing ABCT Convoy | Estimated Increase from Existing ABCT Convoy | Estimated LOS During Proposed SBCT Convoy | Estimated Increase from Proposed SBCT Convoy |
|-------------------------|------------------------|-------------------------------------------|----------------------------------------------|-------------------------------------------|----------------------------------------------|
| I-25 (near Fort Carson) | F                      | F                                         | 0.1%                                         | F                                         | 0.1%                                         |
| I-25 (near PCMS)        | C                      | C                                         | 0.4%                                         | C                                         | 0.4%                                         |
| 160C                    | B                      | C                                         | 1.6%                                         | C                                         | 1.6%                                         |
| 350A                    | A                      | A                                         | 9.3%                                         | A                                         | 9.5%                                         |

Sources: CDOT, 2014; URS, 2008.

ABCT=Armor Brigade Combat Team; LOS=level of service; SBCT=Stryker Brigade Combat Team

Stryker vehicles weigh approximately 18 tons and are 2.6 meters (8.7 feet) tall by 2.7 meters (9.0 feet) wide. They are substantially smaller than some of the tracked vehicles in the existing ABCT. As Stryker vehicles are specifically designed for universal mobility, they meet the dimensional and weight requirements for travel on public highways and arterials with approved DOT permits.

### On-Post Traffic

Traffic volumes on Fort Carson or PCMS occurring between brigade-level training deployments would not change from existing conditions. As with existing ABCT training rotations at PCMS, all vehicles deployed during SBCT training events would be routed through the PCMS cantonment area and would disperse as their mission requires. Increased traffic levels from the proposed SBCTs would not hinder training exercises or result in traffic capacity constraints at PCMS.

### Other Transportation

Due to the conversion of an ABCT to a SBCT, the total number of future ABCT training events would likely be replaced on a one-to-one basis with the SBCT. Because an SBCT has no tracked vehicles, if the Stryker vehicles were driven, the overall number of annual rail shipments to and from PCMS would decrease. If not, there would be an increase in the overall number of rail shipments. Regardless of the mode of transportation used for the Stryker vehicles, effects would be minor.

There would be an increased use of private charter buses used for transporting Soldiers to PCMS during SBCT training events. These effects would be negligible.

### **3.10.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

Long-term minor adverse effects would be expected. There would be no appreciable short-term effects to traffic or transportation resources from Proposed Action Alternative 1B. Long-term effects would result primarily from increased roadway and rail traffic from the transport of equipment and supplies during ABCT, IBCT, and SBCT training at PCMS. The use of other weapon systems and training would also incrementally increase air and maneuver traffic at PCMS. Effects would be minor as these activities, although slightly greater than existing conditions, would be essentially the same in size and nature as they pertain to traffic and transportation.

#### **3.10.2.3.1 ABCT, IBCT, and SBCT Training**

Section 3.10.2.2 discusses potential impacts regarding proposed BCT training activities. As analyzed within Proposed Action Alternative 1A, brigade maneuver training and reconfiguration would result in minor impacts to traffic and transportation. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts from readiness training using new tactics and equipment are discussed below.

#### **3.10.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

Aviation gunnery and flare training would incrementally increase aviation activity at PCMS. Overflights and decoy deployment would be discrete temporary events, and their effects would be negligible when compared to existing conditions. There would be no changes to ground-based operations or ground traffic either on- or off-post. There would be no changes to rail or public transportation. These effects would be negligible.

#### **3.10.2.3.3 Electronic Jamming Systems**

The use of EW technologies would have no effects to transportation or traffic. There would be no changes to ground-based operations or traffic either on- or off-post. There would be no changes to air, rail, or public transportation.

#### **3.10.2.3.4 Laser Targeting**

The use of vehicle mounted or dismounted laser designators and range finders would have no effects to transportation or traffic. There would be no changes to ground-based operations or traffic either on- or off-post. There would be no changes to air, rail, or public transportation.

#### **3.10.2.3.5 Demolitions Training**

Demolitions training in Training Areas 7 and 10 would have no effects to transportation or traffic. There would be no changes to ground-based operations or ground traffic either on- or off-post. There would be no changes to air, rail, or public transportation.

#### **3.10.2.3.6 UAS Training**

Increased training frequency for the Raven and Shadow UASs would have an incremental increase in aviation activity at PCMS. These changes would be negligible when compared to existing conditions. There would be no changes to ground-based operations or traffic either on- or off-post. There would be no changes to rail or public transportation. These effects would be negligible.

### **3.10.2.3.7 UGV Training**

Training using UGVs would require a new vehicle at PCMS. The UGVs would be delivered to PCMS via convoy or rail and off-loaded on-post. The UGVs would then be transported to its designated training area. Changes to on-post traffic during use of the UGVs would be minute when compared to existing conditions. There would be no changes to air, rail, or public transportation. These effects would be negligible.

### **3.10.2.3.8 Airspace Reclassification**

The proposed airspace reclassification would have no effects to transportation or traffic. There would be no changes to ground based operations, and there would be no changes in traffic either on- or off-post from the changes in installation-controlled airspace. There would be no effects to rail or public transportation. A detailed description of the effects of the proposed airspace reclassification on airspace is presented in Section 3.11, Airspace.

### **3.10.2.3.9 DZ Development**

The establishment of two DZs would have an incremental increase in aviation activity at PCMS. These changes would be negligible when compared to existing conditions. There would be no changes to ground-based operations or traffic either on- or off-post. There would be no changes to rail or public transportation. These effects would be negligible.

### **3.10.3 Mitigation Measures**

No mitigation measures would be required; impacts from the Proposed Action Alternatives would be negligible to minor. Permits and compliance with existing regulations would be required for activities associated with training proposed in the future. Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations.

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## 3.11 Airspace

### 3.11.1 Affected Environment

#### 3.11.1.1 Overview

Airspace is the four-dimensional area (space and time) that overlies a nation and which falls under its jurisdiction. Airspace consists of both controlled and uncontrolled areas. Controlled airspace and the constructs that manage it are known as the National Airspace System (NAS). This system is "...a common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures; technical information; and manpower and material" (FAA, 2002).

Navigable airspace is that above the minimum altitudes of flight prescribed by regulations under Title 49, Subtitle VII, Part A, and includes airspace needed to ensure the safety of aircraft launch, recovery, and transit of the NAS (49 USC 40102). Congress has charged the FAA with the responsibility of developing plans and policies for the use of

**Airspace Management** is defined as the direction, control and handling of flight operations in the navigable airspace that overlies the geopolitical borders of the U.S. and its territories.

navigable airspace and assigning, by regulation or order, the use of the airspace necessary to ensure efficient use and the safety of aircraft (49 USC 40103(b); FAA Order 7400.2, 2004). The FAA also regulates military operations in the NAS through the implementation of FAA JO 7400.2J, *Procedures for Handling Airspace Matters* and FAA Handbook 7610.4J, *Special Military Operations*. The latter was jointly developed by the DoD and FAA to establish policy, criteria, and specific procedures for air traffic control (ATC) planning, coordination, and services during defense activities and special military operations. The use of airspace and airfields by Army organizations is also defined in AR 95-2 *Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control and Navigational Aids*.

Different classifications of airspace are defined by different types of altitude measurements. The classifications commonly referred to throughout this section are:

- Above Ground Level (AGL) - This measurement is the distance above the earth and is used at lower elevations in Class-G airspace (defined later within this section), approach/departure situations, or any condition that typically resides in the area between surface and 1,200 feet AGL (or occasionally higher).
- Mean Sea Level (MSL) - This measurement is defined as the altitude of the aircraft above MSL as defined by altimeter instrumentation.
- Flight Level (FL) - FL is for airspace higher than 18,000 feet above MSL up to and including FL600. To obtain FL, the altimeter is set at the International Standard Atmosphere (ISA) and described by dropping the last two digits. FL600 is comparable to 60,000 feet MSL at the ISA setting.

Controlled airspace is defined as a limited section of airspace of defined dimensions within which ATC is provided to Instrument Flight Rules (IFR) and to Visual Flight Rules (VFR) traffic. IFR and VFR are the two modes of flying that can generally be described as follows:

- IFR refers to a method of air travel that relies on instrumentation rather than visual reference, and which is always under the direction of ATC to provide proper separation of aircraft. As aircraft launch at one airport, traverse the sky, and then recover at a different airport, every movement is directed by the ATC of authority for each given area. Control is transferred from one ATC to another as aircraft cross jurisdictional lines defined on Sectional Maps prepared by the FAA. Figure 3.11-1 shows the sectional map with the ROI and the proposed airspace modifications associated with Proposed Action Alternatives 1A and 1B.

- VFR refers to a method of air travel that relies primarily on visual reference (dead reckoning) for location and safe separation of aircraft while in Class-G or Class-E Airspace or as granted by ATC within their defined areas of control. VFR flying is inherently subject to weather conditions.

Controlled airspace has a set of classifications indicated on Sectional Maps to include classes A through E and G (there is no Class-F) as listed below (see Figure 3.11-2):

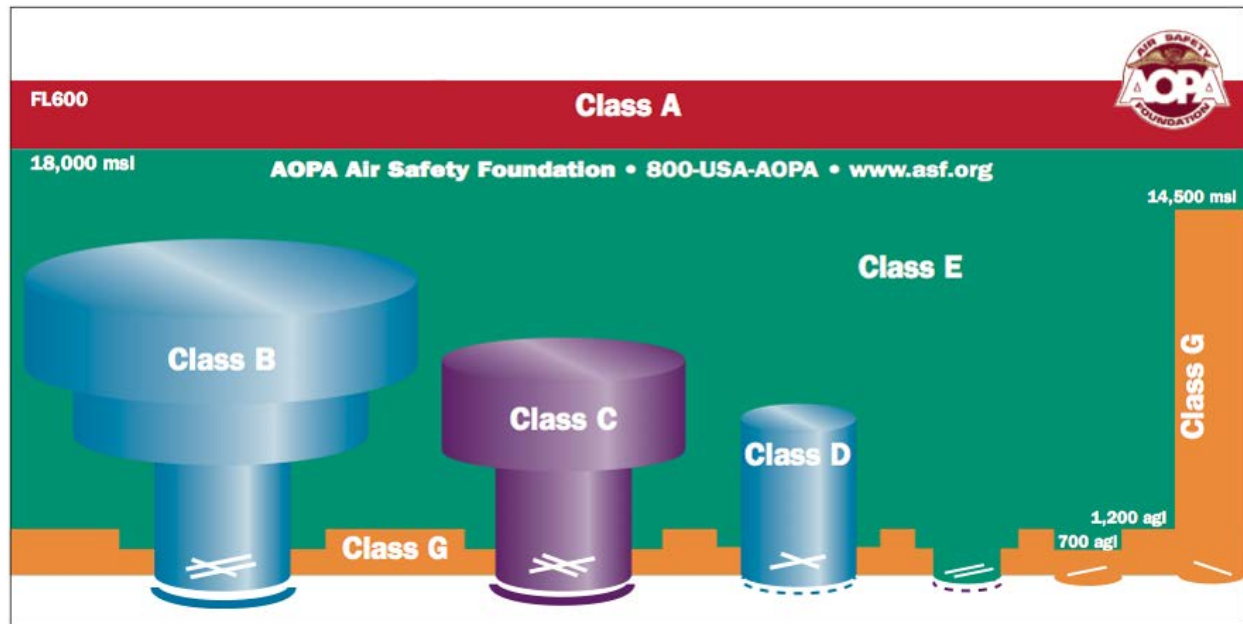
**Sectional Maps** represent airspace features and conditions relative to ground features as a mechanism to control the private, public and commercial use of the airspace to reduce the likelihood of accidents (Figure 3.11-1).

- Class-A airspace refers to the region between above 18,000 feet MSL and FL600 over the contiguous U.S. All traffic in this airspace follows IFR. The airspace is dominated by commercial traffic using jet routes between above 18,000 feet MSL and FL450.
- Class-B airspace is typically associated with larger airports as a control mechanism for the large number of sorties and types of aircraft. It is typically configured in multiple layers resembling an upside down wedding cake. The first layer (inner circle) is typically from surface to 10,000 feet MSL. This circle could be in the range of 10 nautical miles (NM) to 20 NM in diameter. The next circle extends from 1,200 feet AGL to 10,000 feet MSL and might be 30 NM in diameter. The outer circle lies outside of the second and may extend from 2,500 feet AGL to 10,000 feet MSL. This largest circle could be as large as 40 NM. Each airport is potentially different in terms of area coverage and elevations defined on sectional maps. Aircraft must be equipped with specialized electronics that allow ATC to track their altitude, heading and speed. They are also required to maintain radio communication while in the airspace and are given direction as to altitude, heading, and airspeed at all times.
- Class-C airspace is associated with medium-sized airports and is the most common class for airports with control towers, radar approach control, and a certain number of IFR operations. While each is specifically tailored to the needs of the airport, a typical Class-C configuration consists of an inner circle of 5 NM extending from surface to 4,000 feet AGL and an outer circle of 10 NM extending from 1,200 feet AGL to 4,000 feet AGL. Again, each airport is potentially different in terms of area coverage and elevations defined on Sectional Maps. Aircraft must have an operable radar beacon transponder with automatic altitude reporting equipment and are required to maintain radio communication while in the airspace. They are given direction as to altitude, heading, and airspeed at all times.
- Class-D airspace is associated with smaller airports that have an operational control tower. They typically have a single circle of 5 to 10 NM that extends from surface to 2,500 feet AGL. Aircraft may not operate below 2,500 feet AGL within 4 NM of Class-D airspace at an indicated airspeed of more than 200 knots. Pilots must establish and maintain two-way radio communication with ATC for separation services. It is not uncommon for these airfields to have set hours of operation for ATC. Outside of these times, the area reverts to uncontrolled airfield status requiring pilots to fly VFR using "see and avoid" techniques and make radio addresses for all actions.



**Figure 3.11-1. PCMS Sectional of the ROI Showing the Proposed RA**





Source: AOPA Air Safety Foundation, <https://www.aopa.org/-/media/Files/AOPA/Home/Pilot%20Resources/ASI/various%20safety%20pdfs/airspace2011.pdf>.

**Figure 3.11-2. PCMS Airspace Classification Diagram**

- Class-E airspace is any controlled airspace which is not Class A, B, C, or D. It extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Class-E airspace is also used by transiting aircraft to and from the terminal or an enroute environment normally beginning at 1,200 feet AGL to above 18,000 feet MSL. Class-E airspace ensures that IFR traffic remains in controlled airspace when approaching aircraft within otherwise classified airspace or when flying on Victor airways (see Section 3.11.1.2.6, Federal Air Corridors, regarding definition of Victor airways). Federal airways have a width of four statute miles on either side of the airway centerline and occur between 700 feet AGL and above 18,000 feet MSL.
- Class-G airspace is otherwise uncontrolled airspace that has not been designated as Class A, B, C, D, or E. IFR aircraft do not operate in Class-G airspace with the possible exception of aligning an approach or departure on an IFR Flight Plan. This is done at their own risk, as ATC has no knowledge of VFR activity in these areas.

There are also SUAs designed to ensure the separation of non-participating aircraft from potentially hazardous operations or conflict with military operations. These include RAs and MOAs. RAs are four-dimensional sections of airspace that are to be restricted from commercial or private traffic while activated, thereby allowing unfettered execution of military operations. Different sections and stratifications can be activated or deactivated depending on training requirements. Pilots are informed of statuses by NOTAMs. MOAs are four-dimensional sections of airspace defined as having a high level of military use, in order to advise commercial and private traffic to either stay clear of this area or be vigilantly aware of that type of traffic when activated. Figure 3.11-3 shows a vertical diagram of airspace classification within the ROI.

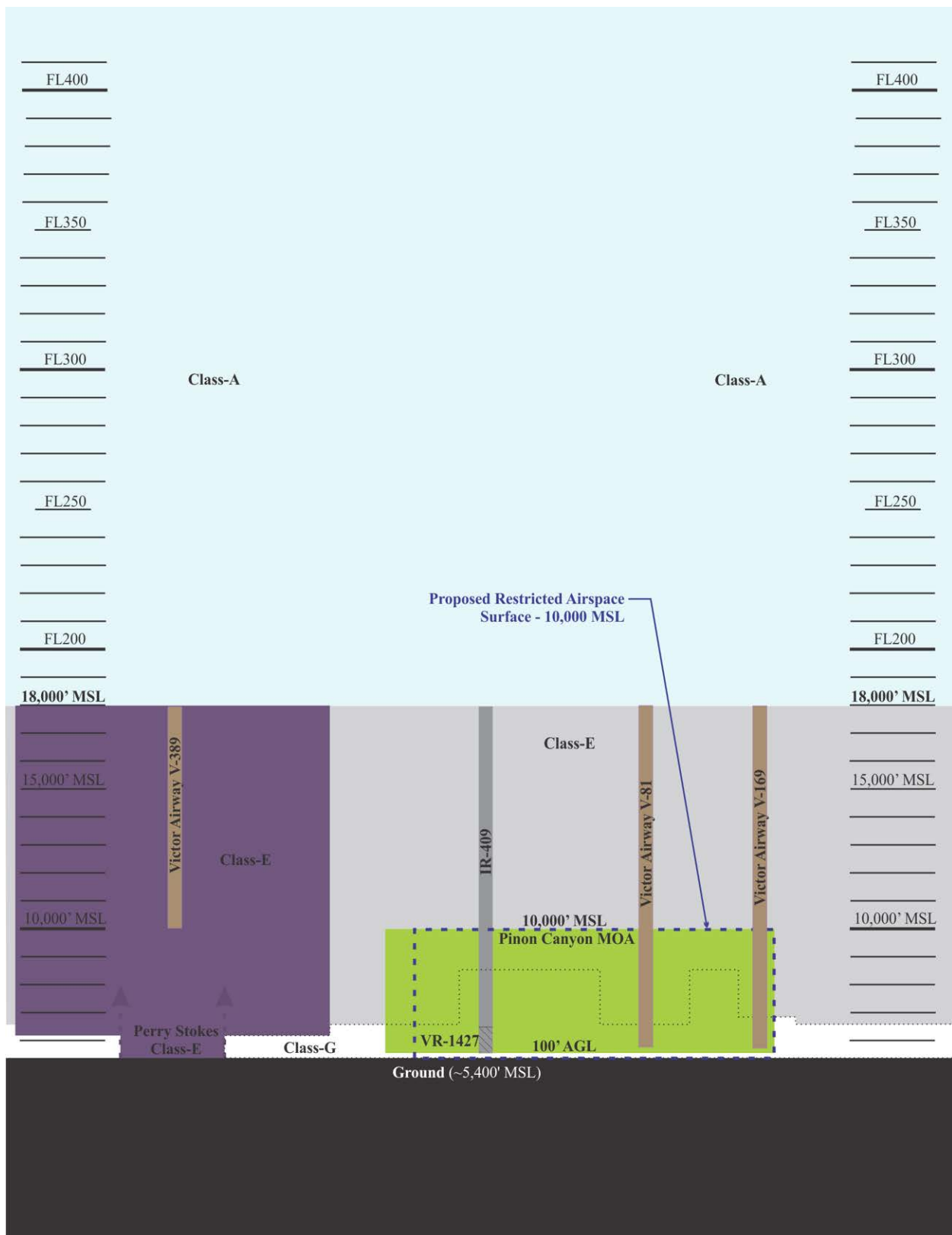


Figure 3.11-3. PCMS Airspace Vertical Diagram of the ROI

### 3.11.1.2 Airspace Components

The components of the airspace ROI include the Piñon Canyon LZ, six DZs, the Piñon Canyon MOA, a controlled fire area (CFA) and two UAS flight areas referred to as the Large Piñon Area and the Small Piñon Area. The Butts Army Airfield (BAAF) at Fort Carson and the R2601 RA are considered outside the ROI but are discussed because of their connection to PCMS. There are also several small, commercial private and civilian airports (see Section 3.11.1.2.8, Civilian Airfields) in this area that may have an effect on airspace and air traffic within the ROI, including: Pueblo Memorial Airport, Perry Stokes Airport (TAD), Jecan Airport, Melon Field Airport, La Junta Municipal Airport, Arkansas Valley Regional Medical Center Heliport, Cottonwood Field Airport, and Fowler Airport.

The ROI contains several designated airways supporting larger airports in the region as well as through traffic (see Section 3.11.1.2.6, Federal Air Corridors). Two Victor Routes transect the PCMS boundary (V81 and V169) and one crosses over TAD (V389). V81 and V169 are centered on a Very High Frequency Omni-Directional Range/Distance Measuring Equipment (VOR DME) beacon located just southeast of PCMS. V81 connects between that beacon and a Very High Frequency Omni-Directional Range/Tactical Aircraft Control (VORTAC) located near the Pueblo Airport. V369 connects from the Pueblo VORTAC south to an intersection with another Victor Route. These Federal Airways will be less important in the near future and may be deactivated all together as the FAA progresses towards full implementation of the Next Generation Air Transportation System (NextGen) utilizing the Performance Based Navigation (PBN) methodology of ATC. The PBN methodology is a system of point-to-point flying, as opposed to the use of established air routes. This will be an important improvement for PCMS and the two routes that transect the airspace above it.

Imaginary surfaces are three-dimensional planes established in airspace surrounding airports for the protection of flight paths associated with launch/recovery (L/R). They exist primarily to prevent existing or proposed manmade objects and objects of natural growth or terrain from extending upward into navigable airspace. According to the provisions set forth in applicable criteria, an object is an "Obstruction to Air Navigation" if it is of greater height than any imaginary surface established under the regulation. The size and configuration of each imaginary surface is based on the classification of each runway. There are six imaginary surfaces surrounding runways on all sides which the FAA and DoD have specified for the purposes of determining obstructions to air navigation: Primary Surface, Transitional Slope, Approach-Departure Control Surface (ADCS) Slope, Inner Horizontal, Outer Horizontal, and the Conical Surface connecting the two.

#### 3.11.1.2.1 Military Airfields

The only military airfields within the ROI are the Piñon Canyon LZ and two helipads in front of the headquarters (HQ) building. The LZ is more akin to a Flight Landing Strip (FLS) or assault strip than a traditional LZ and is used as such with the same frequency as it is used as a rotary wing LZ. Although the length of the runway is well over that of a typical C-130 assault strip, markers can be used to identify imaginary runway ends for assault L/R training. The runway is used as a Forward Area Arming and Refueling Point (FAARP) during exercises and is also used as the only L/R for RQ-7B Shadow UAS. Continual recovery on the gravel surface, however, will cause excessive stress and wear to those airframes.

Piñon Canyon LZ is referred to by the FAA as the Piñon Canyon Airport with call sign OCD5. It is located southeast of the PCMS cantonment area, which is located off of State Highway 350. It has a single gravel/clay runway with orientation 04/22. It is 70 feet wide by 4,500 feet long. There are poorly defined overruns with hammerhead turn-arounds on either end. The runway is supported by a parallel taxiway that runs the length of the runway. There is a sizable gravel

1 aircraft parking apron attached to the taxiway (see Figure 3.11-4 for the Piñon Canyon LZ and  
2 Helipads). This VFR runway has no control tower, service facilities or other aircraft support  
3 facilities, airfield lighting, wind direction indicator, or beacon. There are light poles near the  
4 deployment staging platform, which is near the railroad tracks. The closest light pole is  
5 approximately 1,162 feet away from the runway and rises 100 feet in height. Given its width of  
6 70 feet, the largest fixed-wing asset this runway is capable of supporting is C-130 L/R.  
7 Maintenance personnel have stated that the bearing capacity of the runway was constructed to  
8 support fully loaded C-5 aircraft, suggesting that if the runway were widened it could also  
9 support C-17 for assault L/R as well.

10 A C-130 assault strip, also referred to as an LZ, requires a rectangular Primary Surface  
11 centered over a 150 foot wide runway. The Primary Surface extends not only the length of the  
12 runway but also overruns it, extending an additional 200 feet at both ends. Surrounding the  
13 Primary Surface is the Maintained Area, which extends the length of the Primary Surface but  
14 has a greater width, due to the additional 60 feet that extend outwards on either side. The  
15 Maintained area aligns with the beginning of the Clear Zone. This area must be free of  
16 obstructions and must be graded to within a +10 to -20 percent slope. Encompassing the  
17 Primary Surface, the Maintained Area, and the Clear Zone is the Exclusion Area. The Exclusion  
18 area is 1,000 feet wide, centered on the runway, and extends 500 feet beyond the runway end,  
19 aligning with the end of the Primary Surface (300 foot overrun plus 200 feet). The Exclusion  
20 Area should be free of all buildings, trees, or obstacles not directly associated with the airfield.  
21 Only the features required to operate the airfield are allowed in the Exclusion Area, such as  
22 aprons, taxiways, navigational aids (NAVAIDS), aircraft, support equipment, etc. There is no  
23 transitional slope associated with an LZ. Clear Zones and ADCS surfaces at the runway ends  
24 are required. The Clear Zone is a 270-foot-wide trapezoidal area centered over the runway that  
25 begins at the end of the Maintained Area. The Clear Zone extends outward 500 feet and is 500  
26 feet wide at the outer end. The ADCS is an imaginary plane that extends upward from the end  
27 of the Clear Zone and is also a trapezoidal configuration. It is 500 feet wide at the beginning and  
28 2,500 feet at the minimal outer edge distance of 10,500 feet. It is preferred but not required that  
29 this surface extend out at the same width (2,500 feet) for another 21,500 feet (32,000 feet total).  
30 This surface rises at a rate of 35 horizontal to 1 vertical. No object, fixed or mobile, may  
31 penetrate this surface, including trees, buildings, towers, and vehicles. Refer to Figure 3.11-4 for  
32 airfield imaginary surfaces. There are no apparent violations of these surfaces.

33 The two helipads are used for drop-off and pick up of senior leadership at the HQ building. The  
34 concrete pads are approximately 38 square feet, which is smaller than requirements dictate (50  
35 square feet). They are considered limited-use VFR Helipads, which require a Primary Surface of  
36 150 square feet and a two-directional ADCS. The ADCS is a trapezoid with an inner width  
37 matching the Primary Surface, extending out 1,200 feet, and an outer width of 500 feet. This  
38 surface rises at a rate of 8 horizontal to 1 vertical. A Transitional Slope extends from the other  
39 two sides of the Primary Surface in between the ADCS and rises at a rate of 2 horizontal to 1  
40 vertical.

41 The proximity of these two helipads to each other, with the ADCS intersect in between, requires  
42 the careful coordination of L/R when multiple aircraft are in operation at the same time. These  
43 facilities have no control tower, service facilities, support facilities, NAVAIDS, or lighting, but do  
44 have a wind sock located several yards away by the main entrance road. There are no known  
45 issues with these facilities or associated airspace.

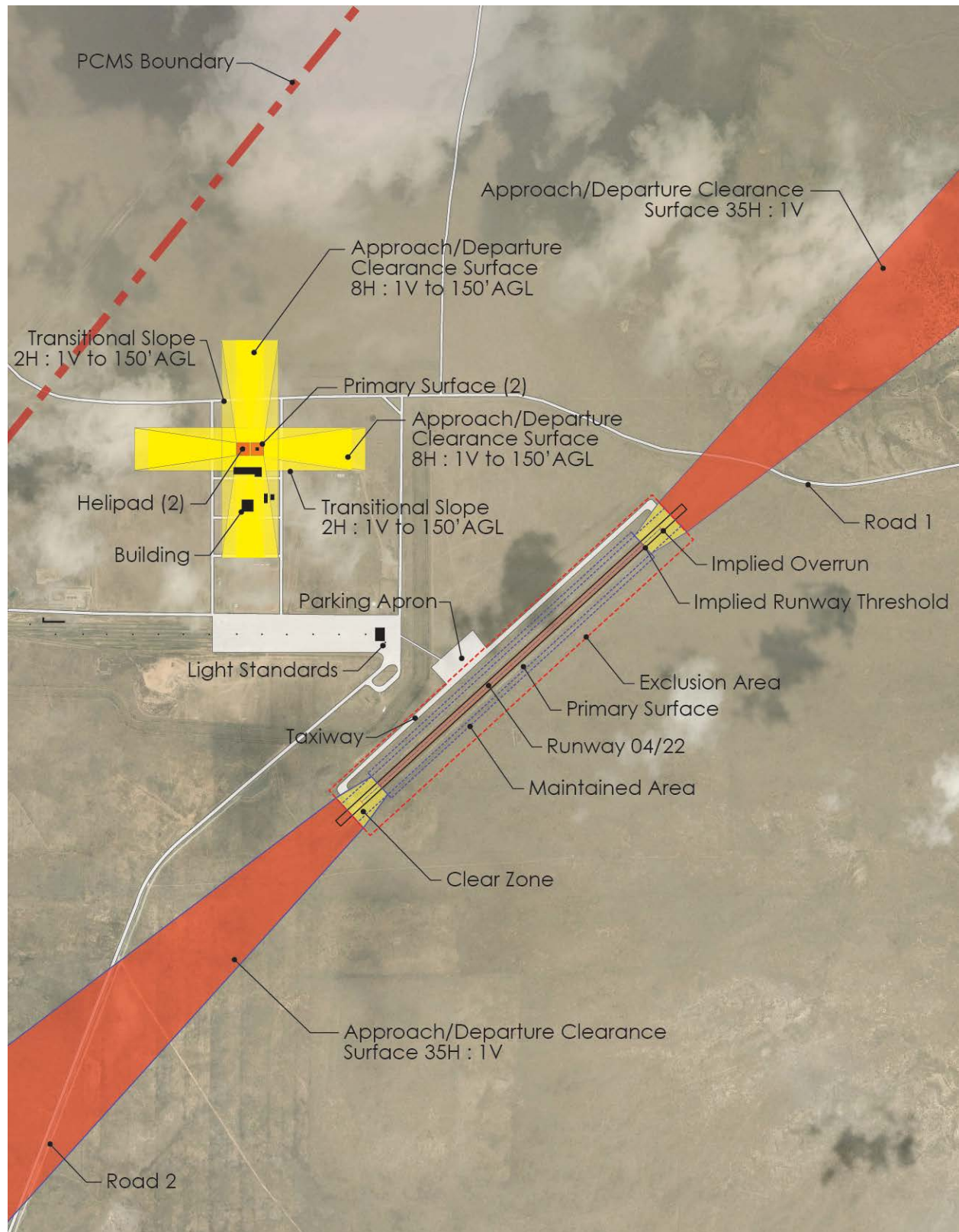


Figure 3.11-4. PCMS LZs and Helipads



### 3.11.1.2.2 Drop Zones

There are six identified DZs at PCMS, including Piñon North DZ, Cholla DZ, Pronghorn DZ, Grandma DZ, Raptor DZ, and Apollo DZ (Figure 3.11-5). One DZ is no longer utilized. It is known as the Piñon DZ, and is a large circular DZ, similar in size to the Pronghorn DZ, and overlaps Range 7. On the ground plane there is little distinction between these DZs and the surrounding terrain. None have improvements or markers of any kind. All usage of DZs must be scheduled with Range Operations 24 hours in advance. NOTAMS are published indicating date, time, altitudes, type of training, and number of drops planned. DZs are used for aerial drops of cargo and personnel by a variety of methods and from a variety of aircraft, both fixed and rotary wing. The DZs are characterized as follows:

**Piñon North DZ.** This is a small, square DZ located at the Piñon Canyon LZ that extends to the southeast. Hazards include buildings within the cantonment area, 100-foot tall light poles at the deployment platform, barbed wire fences, a 150-foot high water tower 1 NM west, and a 330-foot tall tower 2.2 NM to the east. The DZ axis is not aligned with the LZ runway, which can be disorienting. This is also the L/R point for Shadow UAS operations.

**Cholla DZ.** This is a small, square DZ located in the far southwest corner of the range just west of the Hogback ridge. No information is available as it has not been surveyed. The range map, however, indicates that there is an above-ground power line obstruction running east-west through the site.

**Pronghorn Circular DZ.** This is a large circular DZ located in the middle of the range east of Road 3 and its intersection with the gas line. Hazards include a seasonal stream, a ditch up to eight feet deep, trees, power lines, and barbed wire fences.

**Grandma Circular DZ.** This is the largest of all the PCMS DZs. It is a circular DZ located towards the northeast corner of the range but west of the valleys descending toward the Purgatoire River basin. Hazards include Welsh Canyon east of the DZ, drops in excess of 200 feet, trees, power lines, a military operations on urban terrain (MOUT) site, and high terrain surrounding the site, which may obscure approach.

**Raptor DZ.** This is a small circular DZ located north of the Grandma Circular DZ along Road 1A. No information is available as it has not been surveyed, but conditions can be expected to be similar to those of the Grandma Circular DZ.

**Apollo DZ.** This is also a small, circular DZ located north and overlapping a portion of the Raptor DZ. The northern limit touches the northern boundary of the range. No information is available as it has not been surveyed, although it is clear that the buried gas line transects the site and lies at approximately 45 degrees (southwest-northeast) to PCMS's northern boundary. Conditions are likely similar to those of the Raptor DZ.

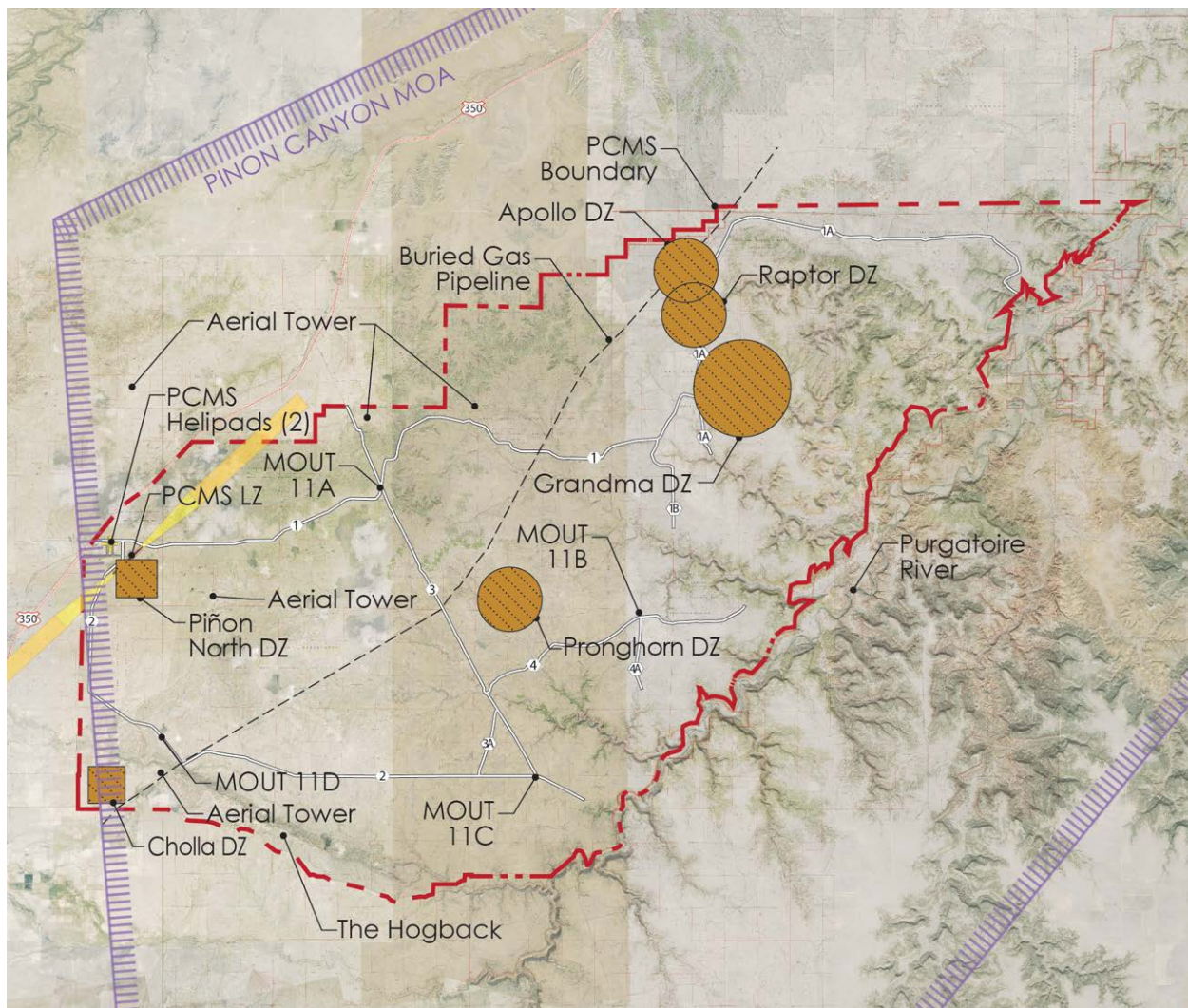


Figure 3.11-5. PCMS DZs

### 3.11.1.2.3 Military Operations Area

The Piñon Canyon MOA overlies PCMS and beyond, extending from near the New Mexico border up to near La Junta, Colorado (Figure 3.11-1). This MOA exists to help reduce the likelihood of interaction between public, private, and commercial aircraft and military activities including ground fire and aircraft movements. This is accomplished by identifying to VFR traffic that the area is highly used by military aircraft and by redirecting IFR traffic safely through or away from the area. It extends from 100 feet AGL up to 10,000 feet above MSL (Figure 3.11-2 and 3.11-3). With an average ground elevation of 5,400 feet above MSL, this results in a swath of airspace approximately 4,600 feet high. The MOA is only activated when needed. This requires no less than one hour prior notification by the using unit, BAAF ATC, or Range Operations to the Denver ARTCC. Utilization of the MOA is relatively low. For example, in FY 2012 the Piñon Canyon MOA was activated a total of eight days for 102 sorties spanning 63.5 hours flown by Fort Carson units as well as rotational and other visiting units. By comparison, the R2601 RA over the Fort Carson range was activated a total of 349 days for 888 sorties spanning 8,382 hours. The Piñon Canyon MOA usage represents just 2 percent of the days, 11



percent of the sorties, and less than 1 percent of the hours flown in the R2601 by the same units in the same FY.

Victor routes V81 and V169 traverse the MOA (northwest to southeast and north to south, respectively). When activated, the Denver ARTCC reroutes IFR traffic on these routes up and over the 10,000-foot ceiling. When not activated, portions of the Class E airspace have higher floor elevations. Three separate sections have Class E floor limitations of 6,900 feet above MSL (one section) and 8,500 feet above MSL (two sections). The airspace distance AGL from the majority of land area, having an average elevation of 4,750 feet above MSL, beneath the lower floor of 6,900 feet above MSL, is 2,150 feet AGL.

#### 3.11.1.2.4 Controlled Fire Area

There are five small arms ranges on PCMS (see Figure 3.11-6). Ranges 1, 3, 5, and 7 are static fire ranges south of the cantonment area along the western PCMS perimeter. Range 9 is a maneuver range approximately 8 miles east of the LZ and 3.5 miles northeast of Pronghorn DZ. A CFA is established for the ranges when in use. A CFA is established by a request memorandum sent from Range Operations through the Seattle, Washington Department of the Army Representative (DAR) then forwarded to the FAA for approval. The request includes area grids with altitudes that encompass the required SDZs for the largest weapon system to be used.

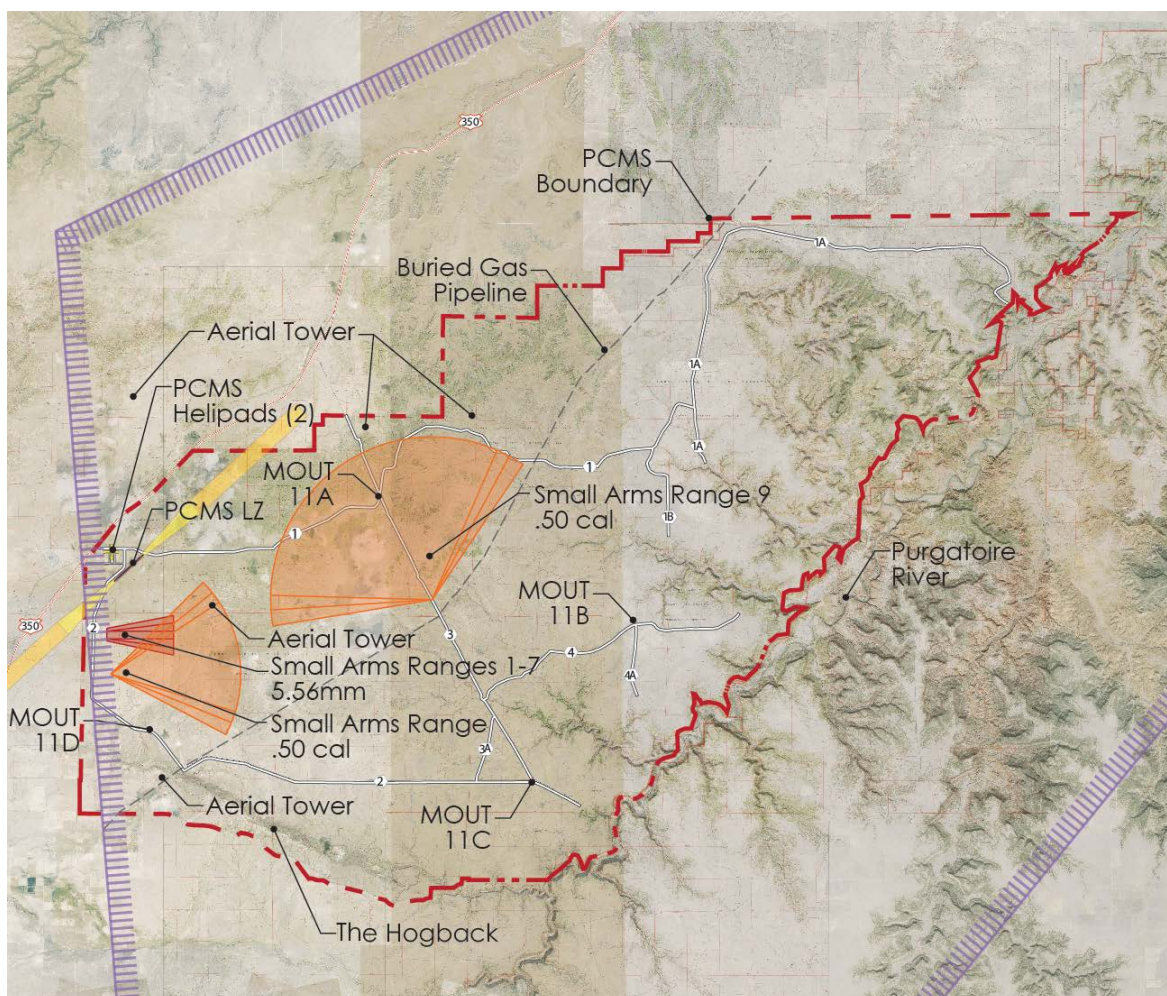


Figure 3.11-6. PCMS Ranges

Authorized activities within PCMS CFAs include:

- Heavy weapons systems familiarization and qualification – 120-mm tanks, Operation Desert Storm (ODS) Bradley, .50cal, 25-mm, 7.62-mm, 5.56-mm, and demo.
- Mortar Familiarization – 60-mm, 80-mm, and 120-mm (mortar activities have not been conducted at PCMS).
- Surface Firing – 9-mm, .38cal, 12 gauge slug, .45cal, 5.56-mm, 7.62-mm, M203 grenade launcher, hand grenade, signal flares, .50cal, and M1A2 tank laser systems.

The following safety precautions must be adhered to:

- The CFA must be established and managed in accordance with FAAO JO 7400.2 and AR 95-2.
- The using agency shall appoint a lead Safety Officer to ensure operations are conducted in accordance with the requirements outlined by the FAA Letter of Authorization.
- Firing shall not be conducted when the cloud ceiling is less than 1,000 feet above the maximum ordinate (vertical limit) of fire for the munitions utilized and when visibility is less than 5 miles.
- Visibility shall be sufficient to maintain visual surveillance of the entire CFA and for a distance of 5 miles beyond the CFA boundary in all directions. Weather information is obtained from the National Weather Service via ADDS website.
- No projectile shall enter any cloud formation.
- The CFA shall be clear of non-participating aircraft or personnel, before starting and continuously while conducting hazardous activities.
- The Range Officer in Charge (OIC) is responsible for ensuring that all firing ceases prior to aircraft penetration of the CFA airspace. A handheld radio will be issued to contact the Range Safety Officer as a form of backup communication with the range tower. A designated Safety Officer will be present on all live-fire ranges. Designated Safety Observers will have continuous and effective communication with the Range Safety Officer and Range Operations at all times. A sufficient number of Safety Observers will be in place to cover the entire area. Safety Observers will be provided continuous effective communications capability at all firing points. Each Safety Observer will be thoroughly briefed of his or her observer responsibilities. If communication is lost at any time, hazardous activities in the CFA will cease until reliable communication is reestablished. Activities in the CFA will cease if a non-participating aircraft approaches the area.
- Aircraft involvement in any training will be controlled through communication, coordination, regulation, Army Aviation Support Facility SOPs, safety briefings, and inspections. Aircraft involved will have constant communications contact with the range tower. No aerial door gunnery activities will be conducted. Aircraft may be utilized for transport of equipment and/or personnel to and from the ranges.
- Any violations of safety precautions outlined above or referenced in FAAO JO 7400.2 shall be a basis for the FAA to withdraw the CFA.
- The using agency shall provide the local flight service station and operations supervisor the following information at least 24 hours prior to operations within the CFA:
  - Location of the area
  - Time of use
  - Activities to be conducted
  - Maximum ordinate of fire
  - Using agency

All firing activities are allowed 24 hours a day. The FAA does not control non-participating aircraft entering the airspace over PCMS. The Army unit in control of the live-fire activities has the responsibility to post air guards on the ground to watch for airspace intrusion and radio in a cease fire order when aircraft are spotted in the vicinity. Currently, there are no air-to-ground or ground-to-air live-fire exercises.

### 3.11.1.2.5 Unmanned Aerial Systems

DoD defines a UAV as a powered, aerial vehicle that:

- Does not carry a human operator
- Uses aerodynamic forces to provide vehicle lift
- Can fly autonomously or be piloted remotely
- Can be expendable or recoverable
- Can carry a lethal or non-lethal payload

This definition does not include ballistic or semi-ballistic vehicles, cruise missiles, and artillery projectiles. Unmanned aircraft (UA) can carry cameras, sensors, communications equipment, or other payloads for military and other missions such as ISR; ordnance/messenger/object delivery; communication relay; day/night reconnaissance, surveillance, targeting, and acquisition (RSTA); and/or BDA. UA can be launched from runways, ships, vehicles, or by hand. DoD has adopted the terminology UA versus UAS (UAV) when referring to the flying portion of the UAS. UAS is used to highlight the fact that the UA is only one component of the system and is compatible with the FAA's decision to treat UASs as aircraft for regulatory purposes.

UAS assets are becoming more important for units in training and battle and are being used more frequently. Two Fort Carson units, including the 10<sup>th</sup> Special Forces and 4ID, utilize PCMS for range training of two UAs: the RQ-7B Shadow and the RQ-11 Raven. Each of these units has two FAA-issued COAs to operate the Shadow UAS only within the designated three dimensional-flight areas referred to as the Large Piñon Area and the Small Piñon Area (Figure 3.11-7). Additionally, there is a Memorandum for Record authorizing Raven UAS operations in Class-G airspace directly over PCMS.

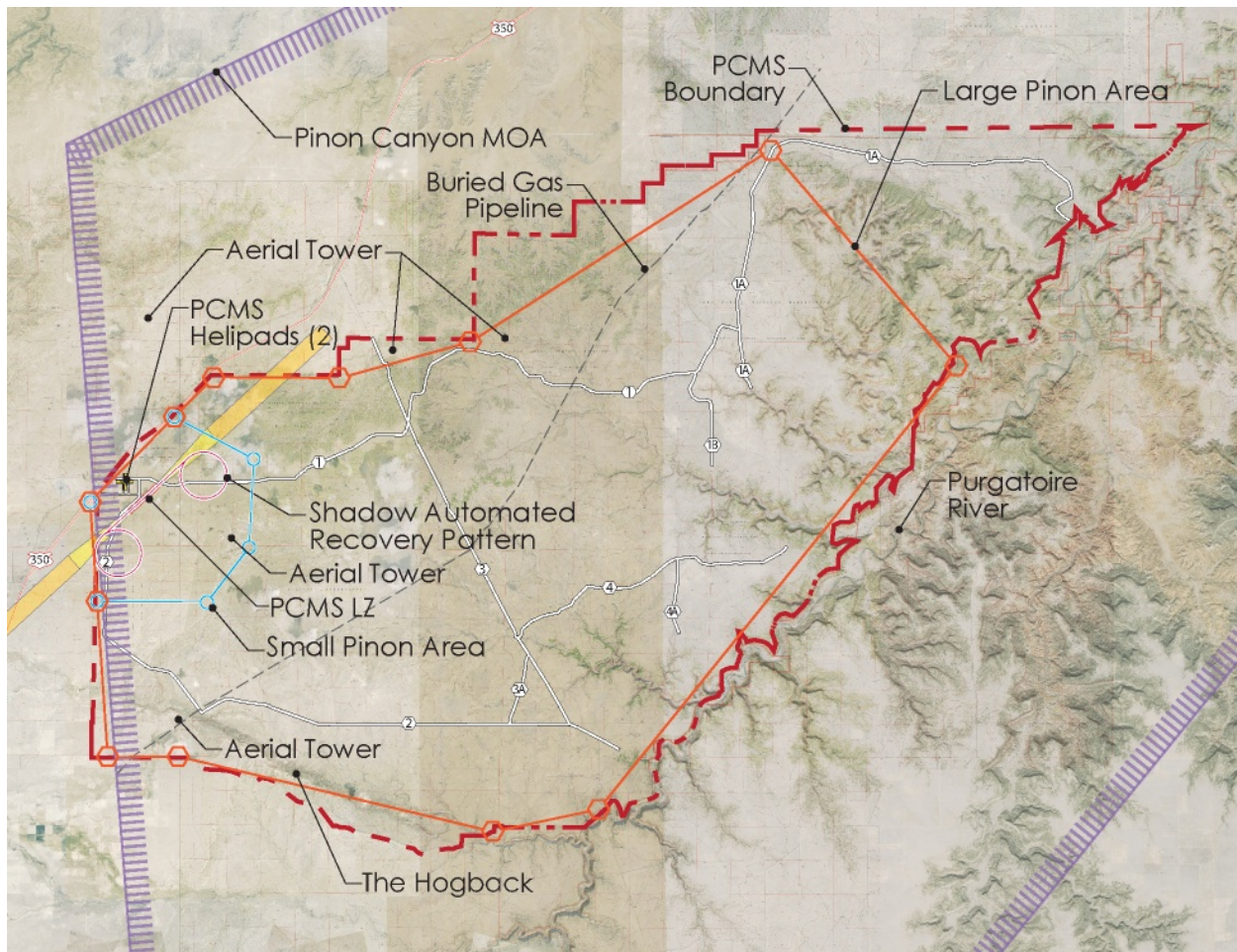
#### RQ-7B Shadow UAS

The RQ-7B Shadow is a small, Tier II, short-range, tactical UAS that requires radio line-of-sight (RLOS) during operations. Shadows typically operate between 8,000 and 10,000 feet AGL and have a maximum range of 27 miles. Training for units currently operating the RQ-7B Shadow at PCMS is restricted to basic flight training and reconnaissance although the aircraft are capable of supporting a variety of equipment payload pods. These include the POP300D laser designator, the Intrepid Tiger II communications intelligence and jamming pod, and the ALQ-99 Tactical Jamming System (TJS) designed for IED disablement. Shadow aircraft are launched and recovered from the PCMS LZ. These aircraft typically are stored at the unit's Company Operations Facility (COF) or the Tactical Equipment Maintenance Facility (TEMF) at Fort Carson and are transported to PCMS for training flights in specially designed HMMWVs. The Shadow UAS is only operated within the designated three dimensional flight areas referred to as the Large Piñon Area and the Small Piñon Area (see Figure 3.11-7 for the UAS flight areas) according to provisions outlined in the COA.



RQ-7B Shadow





**Figure 3.11-7.PCMS UAS Flight Areas**

The ATC Special Provisions of the COA states:

- A distance NOTAM must be issued no more than 72 hours, but no less than 48 hours, in advance of operations.
- The pilot in command (PIC) of the UAS will contact Denver ARTCC one hour prior to commencing operations to provide start and stop times and NOTAM number.
- The PIC will report completion of operations within one hour to Denver ARTCC.
- The PIC will describe the airspace when coordinating NOTAM.
- In conjunction with NOTAM submission, ATC will be notified if a chase aircraft will be used.
- The Piñon Canyon MOA will not be activated solely for UAS operations authorized in the COA.
- The PIC will contact Piñon Canyon Range Operations for MOA status coordination.
- The PIC will contact the 27<sup>th</sup> Operations Support Squadron (OSS), Cannon Air Force Base for de-confliction with possible low altitude tactical navigation operations.
- The PIC will contact the 140<sup>th</sup> Operations Group (OG), Buckley Air National Guard Base (ANGB) for de-confliction with IR-409 and VR-1427.
- The Shadow UAS will squawk 1200 code (transponder set to code 1200) during operations.

- ATC Special Provision A will be used in lieu of direct, two-way communications with ATC.
- Small Piñon Area restrictions: Operations will be conducted at or below 8,000 feet above MSL. Ground observers are approved for operations below 2,000 feet AGL stationed anywhere in the Small Piñon Area provided all observers have direct and immediate radio contact with the PIC. If an observer loses sight of the UAS, the PIC shall be notified and shall direct the UAS to proceed to the PCMS LZ until visual contact is regained. If visual contact is not regained, the PIC will initiate flight termination. Airborne observers are required for operations at and above 2,000 feet AGL. Night operations are confined to the Small Piñon Area below 2,000 feet AGL.
- Large Piñon Area restrictions: Operations will be conducted at or below 4,000 feet AGL, not to exceed 10,000 feet MSL. Airborne observers are required. Night operations are not authorized. Maximum operating altitude when operating within 4 NM of the centerline of V-81 is 9,500 feet MSL.
- Chase aircraft restrictions: Chase aircraft must remain at a safe distance from UAS to ensure collision avoidance. Must remain close enough to UAS to provide visual detection of any conflicting aircraft and advise PIC. Pilot/observer must maintain direct voice contact with the UAS PIC. Operations will not be conducted in instrument meteorological conditions (IMC). The chase pilot, during a lost link situation, must be notified immediately along with ATC. The chase pilot will report to ATC that the UAS is performing lost link procedures as planned or if deviations are occurring. Chase pilot will ensure safe separation with the UAS and immediately notify ATC and the UAS PIC during loss of visual contact with the UAS by both the chase pilot and observer, when such contact cannot be promptly re-established. The UAS PIC will either execute lost link procedures to facilitate a rejoin, recover the UAS, or terminate the flight as appropriate.
- Concurrent operations between the Large and Small Piñon Areas are not authorized.

### **RQ-11 Raven UAS**

The RQ-11 Raven is a Tier I UAS. It is hand-launched and ground- or net-recoverable, allowing units to deploy the device practically anywhere in theater. A Raven aircraft typically operates between 250 and 500 feet AGL, although it is capable of flight up to 14,000 feet above MSL. It has a maximum range of 6.2 miles. Training units operate Raven aircraft throughout PCMS as per the MOA for Operation of UAS in the NAS (September 24, 2007) between DoD and the DAR-FAA. The memorandum constitutes notification of intent to operate a DoD UAS that weighs less than 20 pounds and is operated below an altitude of 1,200 feet AGL within Class-G airspace directly over PCMS. The following procedures for flying the Raven UAS at PCMS contain multiple, redundant means of communication and observation to meet the administrative expectations required by the FAA:



RQ-11 Raven

- Flying the Raven UAS is approved by the occupying brigade. The communications chain is from troop to squadron to brigade.
- The designated observer/controller (O/C) for the specific element must be in direct contact with Range Operations. The O/C must be present with the Raven operator, ensuring the Raven Operational Zone (ROZ) request is given to Range Operations 30 minutes prior to launch. The administrative procedures required to launch a Raven are

the responsibility of the O/C. Once Range Operations is notified, it notifies the BAAF Tower. The BAAF Tower then confirms launch time and ensures appropriate notations are made in the FAA system. The O/C contacts Range Operations five minutes prior to launch, then Range Operations notifies BAAF Tower of the five-minute warning.

- The operating unit must ensure that a dedicated observer supports the Raven operation. The observer watches for any approaching aircraft and reports to the operator. If an aircraft is approaching the ROZ, the operator will immediately land the Raven.
- When the brigade approves Raven UAS flight, there will be a net broadcast that a Raven is in the air. At this point, all Soldiers become sensors for approaching civilian aircraft and will report through the unit chain of command. If an aircraft is reported approaching the ROZ, the unit will notify the operator who will immediately land the Raven.

Fort Carson units utilizing PCMS for UAS operations expressed concern with the costs and operational disruption associated with continued use of COAs, ground observers, and chase planes currently necessary for on-site UAS training. Because these elements are not necessary for UAS operations in the R-2601 RA, it is preferable to train there regardless of the congested airspace from other activities.

#### **3.11.1.2.6 Federal Air Corridors**

Victor airways are Federal air corridors that are established for IFR traffic by VORTAC beacons strategically located throughout the U.S. They provide established traffic routes between 700 feet AGL and 18,000 feet above MSL in what is considered Class-E airspace. They have an established width of four miles on either side of the airway centerline. It should be noted that these systems will be phased out over the next 20 years as the FAA begins to implement its "Next Gen" ATC system. There are three Victor airways that traverse the ROI as follows (see Figure 3.11-8 for air corridors and routes):

**V-389.** The Victor-389 route runs at a heading of 163 and 343 degrees. It runs from the Cimarron VORTAC southwest of Raton Municipal Airport/Crews Field (RTN) to the Pueblo VORTAC. The route parallels the western boundary of the Piñon Canyon MOA approximately 10 miles to the west and directly over TAD. There are no conflicts between air traffic in this corridor and PCMS operations.

**V-81.** The Victor-81 runs at a heading of 134 and 316 degrees from the Panhandle VORTAC at the Rick Husband Amarillo International Airport (AMA) to the Pueblo VORTAC. The route bisects the Piñon Canyon MOA and PCMS just west of the Apollo, Raptor, and Grandma DZs. Activity at those DZs requires activation of the Piñon Canyon MOA and the FAA to re-route air traffic above 10,000 feet MSL over PCMS.

**V-169.** The Victor-169 runs at a heading of 167 and 347 from the Tobe VOR DME to the Hugo VOR DME. This route crosses over the far northeast corner of PCMS within the Piñon Canyon MOA and has little impact on PCMS operations. Traffic on V-169 is routed over the MOA when activated, eliminating any potential conflicts.

Traffic in this area is relatively light in comparison to more metropolitan areas. Traffic on the air routes is also considered to be light. Of the total flights in the Piñon Canyon MOA (425) for a representative month (July 2014), the V81 had 54 flights while V169 had just 5. All other IFR traffic registered through the MOA for the month totaled 366 flights. There is no data for VFR activity. Assuming July 2014 was an average month for air traffic, the yearly total would be approximately 648 (V81), 60 (V169), 4,392 (all other IFR traffic).





Figure 3.11-8. ROI Airways and Military Routes

### 3.11.1.2.7 Military Training Routes

In addition to the three Federal air corridors in the ROI, there are two routes used by the military for access to PCMS and two military training routes (MTR) that bisect PCMS. The first PCMS access route is referred to as "Direct Route" and is flown at 1,000 feet AGL between BAAF and the PCMS LZ. This is the primary travel route flown between Fort Carson and PCMS. The second route is Low-Level Route Hawk, a low altitude transit training route flown at 100-300 feet AGL. Route Hawk is a loop route containing 14 checkpoints, originating at the southern boundary of R-2601 RA, heading south and east to the northwest corner of PCMS, and then returning north and west to the BAAF. Route Hawk requires approximately 30 to 45 minutes each way and is considered part of the training flight. Out of a typical training sortie of just three hours, which is roughly equivalent to a tank of gas, this leaves no more than 90 minutes on-site at PCMS for other training activities. The Direct Route can be traversed in as little as 15 to 30 minutes.

The MTRs are instrument route (IR)-409 and visual route (VR)-1427 established along the same corridor. IR-409 is flown under the control of the Denver ARTCC with one segment above 1,500 feet AGL. VR-1427 is flown without ATC and is from surface up to 1,500 feet AGL (see Figure 3.11-8 for air corridors and routes).

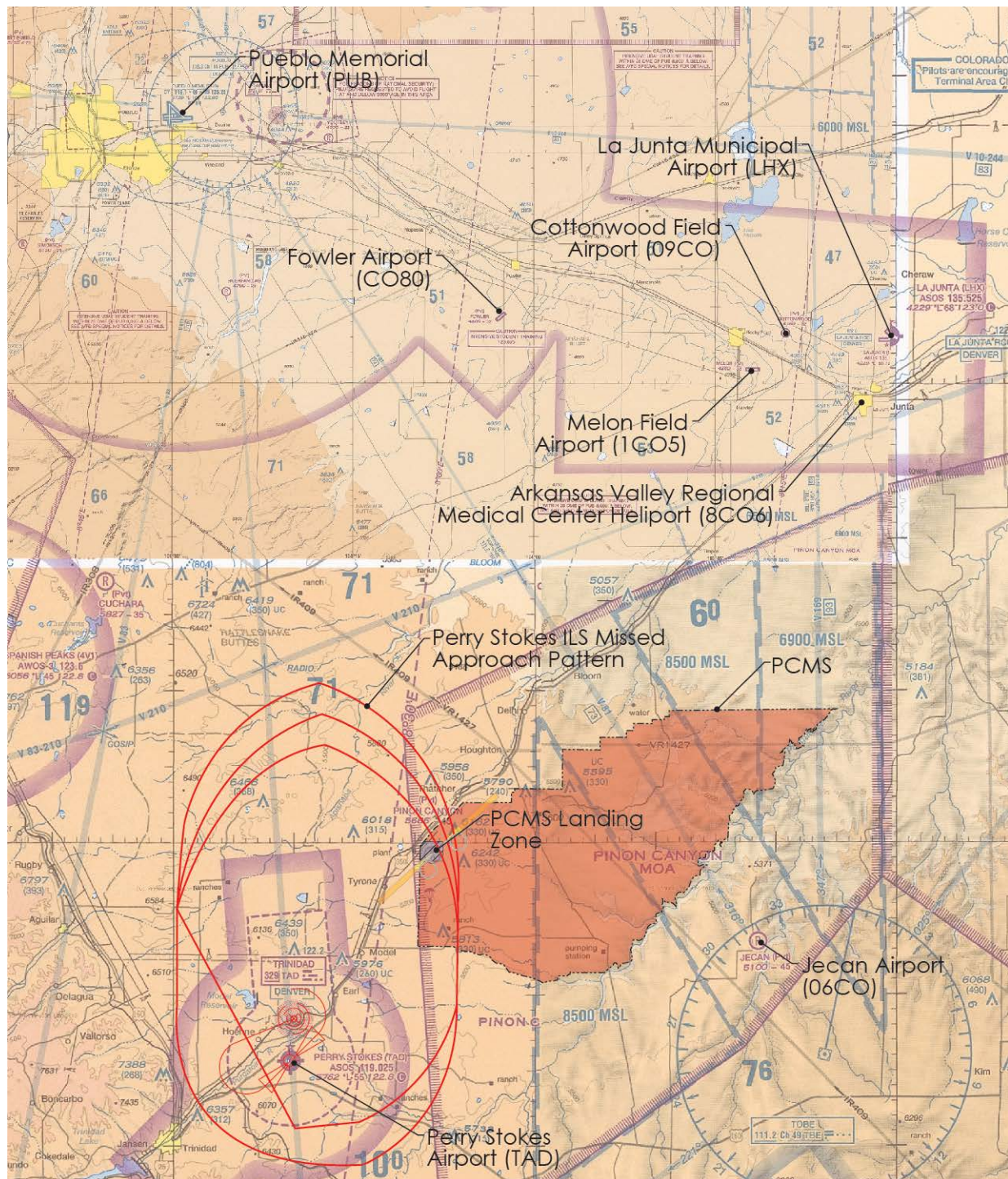
### 3.11.1.2.8 Civilian Airfields

The following contains information on civilian airfields located within the ROI (see Figure 3.11-9 for airfields in the ROI):

**Pueblo Memorial Airport (PUB).** The Pueblo Memorial Airport is a public airport five miles east of Pueblo, Colorado. The primary runway is a 10,496 foot long asphalt runway (8R-26L) in good condition. There is also a secondary 8,310-foot long asphalt runway (17-35) and a 4,690-foot long asphalt runway (8L-26R). PUB has a control tower, but Denver approach provides approach-departure services from 0600 to 2200. Denver Center ARTCC provides approach-departure services from 2200 to 0600 daily. The airfield is within a Class-E circle that extends north of Colorado Springs, Colorado and southeast past La Junta, Colorado. The airport reports an average of 454 aircraft operations per day, primarily due to general aviation. The airspace surrounding PUB experiences a high volume of intensive student training between 500 feet AGL and 8,500 feet MSL. These students are primarily from the U.S. Air Force Academy (USFA) and operate to the south and southeast of the airport. This is not considered in conflict with PCMS airspace use.

**Perry Stokes Airport (TAD).** The Perry Stokes Airport is a public airfield 10 miles northeast of Trinidad, Colorado. The airport has one paved runway (03-21) and one gravel runway (09-27) both 5,500 feet in length. There is no control tower or ATC. IFR traffic is managed by Denver Center ARTCC while VFR traffic is unmanaged. This airfield is within a Class-E circle approximately 15 NM across. The controlled airspace extends from the surface up to 18,000 feet above MSL. This airfield is primarily used by recreational fliers and occasionally for military training flights and refueling. The airfield has an unusually large Instrument Landing System (ILS) missed approach pattern that extends into the Piñon Canyon MOA over the western portion of PCMS, including the PCMS LZ, that could present a potentially dangerous situation for aircraft following this pattern relative to on-going operations at the PCMS LZ, The Piñon North DZ, Cholla DZ and Ranges 1-7 (see Figure 3.11-9 for airfields in the ROI and the TAD ILS missed approach pattern).





**Figure 3.11-9. Airfields within the ROI**

**Jecan Airport (06CO).** The Jecan Airport is a small, privately-owned airfield with a single 4,500-foot long turf runway (17-35). There is no control tower or ATC. The airfield is below the V-81 Federal air corridor and the Piñon Canyon MOA. Launch and recovery activities at this airport require vigilant and expedient flight away from potential conflict when the MOA is active and/or aircraft are on V-81. The airfield is base to two single engine airplanes.

**Melon Field Airport (1CO5).** The Melon Field Airport is a small, private-use airfield with a 3,780-foot long asphalt runway (08-26) and a 2,500-foot long gravel runway (18-36). There is no control tower or ATC. This airfield is within a Class-E circle associated with PUB. IFR traffic is managed by Denver Center ARTCC while VFR traffic is unmanaged. The airfield is three miles southeast of Rocky Ford, Colorado and has eight aircraft based on the airfield. There are no perceived conflicts with activities associated with this airfield and PCMS activities.

**La Junta Municipal Airport (LHX).** The La Junta Airport is a public airfield with a 6,849-foot long asphalt runway (08-26) and a dilapidated 5,803-foot long asphalt/concrete runway (12-30). There is also a 145-foot square asphalt helipad. There is no control tower or ATC. This airfield is within a Class-E circle associated with PUB. IFR traffic is managed by Denver Center ARTCC while VFR traffic is unmanaged. The airfield is three miles north of La Junta, Colorado. There are no perceived conflicts with activities associated with this airfield and PCMS activities.

**Arkansas Valley Regional Medical Center Heliport (8CO6).** The Arkansas Valley Regional Medical Center Heliport is a private-use (medical) heliport with a single 60-foot square concrete helipad in La Junta, Colorado. There is no control tower or ATC. This airfield is within a Class-E circle associated with PUB. There are no perceived conflicts with activities associated with this airfield and PCMS activities.

**Cottonwood Field Airport (09CO).** The Cottonwood Field Airport is a small, private-use 3,200-foot long turf strip (09-27). There is no control tower or ATC. This airfield is within a Class-E circle associated with PUB. The airfield is 3 miles northwest of Swink, Colorado and has two single engine airplanes based on the airfield. There are no perceived conflicts with activities associated with this airfield and PCMS activities.

**Fowler Airport (CO80).** The Fowler Airport is a small, private-use airfield with a 3,240-foot long asphalt runway (04-22) and a dilapidated 2,850-foot long dirt runway (12-30). There is no control tower or ATC. This airfield is within a Class-E circle associated with PUB. The airfield is three miles south of Fowler, Colorado and has five single engine airplanes based on the airfield. There are no perceived conflicts with activities associated with this airfield and PCMS activities.

### 3.11.1.3 Airspace Use and Management

The ROI is a moderately utilized swath of airspace that regularly sees military, commercial, private and recreational air traffic flying both VFR and IFR. Nearly all traffic outside of PCMS and Fort Carson requiring ATC is managed by Denver Center ARTCC. The one exception is air traffic in and out of the Class-D circle of the Pueblo Airport. This is managed by the Colorado Springs (COS) ATC along with in-bound and out-bound traffic to that airfield. Traffic over PCMS and Fort Carson is managed by BAAF ATC. Traffic between these two is typically VFR. Traffic in the MOA is managed by Denver Center.

### 3.11.2 Environmental Consequences

This section provides a discussion of the possible environmental impacts to airspace that could result from the No Action and Proposed Action alternatives. Impacts to airspace would be considered significant if they are in violation of FAA regulations, undermine the safety of either civil or commercial aviation, or infringe on current private and commercial flight activity and flight corridors. An overall level of impact was determined based upon the collective sum of the many elements, although not all elements have an airspace component or affect thereof. Table 3.11-1 provides a comparison summary of anticipated level of impacts.

**Table 3.11-1. Summary of Airspace Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            | X     |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         | X          |       |          |             |            |
| IBCT Training                         | X          |       |          |             |            |
| SBCT Training                         | X          |       |          |             |            |
| Combined Elements <sup>a</sup>        | X          |       |          |             |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| Aviation Gunnery and Flare Training   |            | X     |          |             |            |
| Electronic Jamming Systems            |            |       | X        |             |            |
| Laser Targeting                       |            | X     |          |             |            |
| Demolitions Training                  | X          |       |          |             |            |
| UAS Training                          | X          |       |          |             |            |
| UGV Training                          | X          |       |          |             |            |
| Airspace Reclassification             |            | X     |          |             |            |
| DZ Development                        | X          |       |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |

a. Overall combined level of direct impact to airspace would be minor. Range Operations would provide oversight and scheduling to deconflict internal airspace use.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 3.11.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS

Under the No Action Alternative, the airspace would remain unchanged with the greatest level of protection provided for military operations classified as the existing Piñon Canyon MOA. Without the protections provided by RA there would be limitations as to what types of training could be conducted at PCMS, making it less useful for real-world scenarios and force-on-force training employing the latest and emerging technologies. Military pilots have stated that the distance of travel to PCMS is such that they would prefer using facilities available within the R-2601 located closer to Fort Carson and BAAF, to the limited capabilities offered at PCMS. One exception to that statement is activities in support of brigade-level ground force training providing real-world scenario force integration training that require on-site stays of two weeks or more involving approximately 20 helicopters.

The overall impact of the No Action Alternative to airspace is minor. The impact to training capabilities at PCMS is greater. Aviation gunnery, flare training, laser targeting, EW jamming,

demolitions training, and unencumbered UAS flights would continue to be conducted within Fort Carson's congested R-2601 airspace.

### **3.11.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impact Measurement**

Proposed levels of BCT training at PCMS as described in Section 2.2.2 would have little to no effect on airspace use. Units would continue to train as they have in the past, with the addition of Stryker vehicles under the newly configured BCTs. There is a possibility that these reconstituted units may choose to operate additional UASs. This would, however, continue to be conducted under the restrictions of the existing COA, resulting in no significant changes to airspace use. Negligible effects would be anticipated.

In addition, the establishment of a BCT-level training intensity limit using MIMs to complement the 4.7-month brigade-level training period duration would have no adverse impacts to airspace use.

### **3.11.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment, and infrastructure improvements. Alternative 1B consists of seemingly independent training activities. Each type, however, is part of the larger scenario of modern warfare training. This includes aviation gunnery, flare training, live fire, laser target designation, demolitions training, and DZ development. Most of these individual training activities rely on the establishment of RA over PCMS, due to the threat that these activities can pose to non-participating aircraft. Refer to Figure 2.2-6, Sectional Depicting Proposed RA Relative to PCMS, for a depiction of the proposed RA. Use of UGVs would have no effect on airspace use.

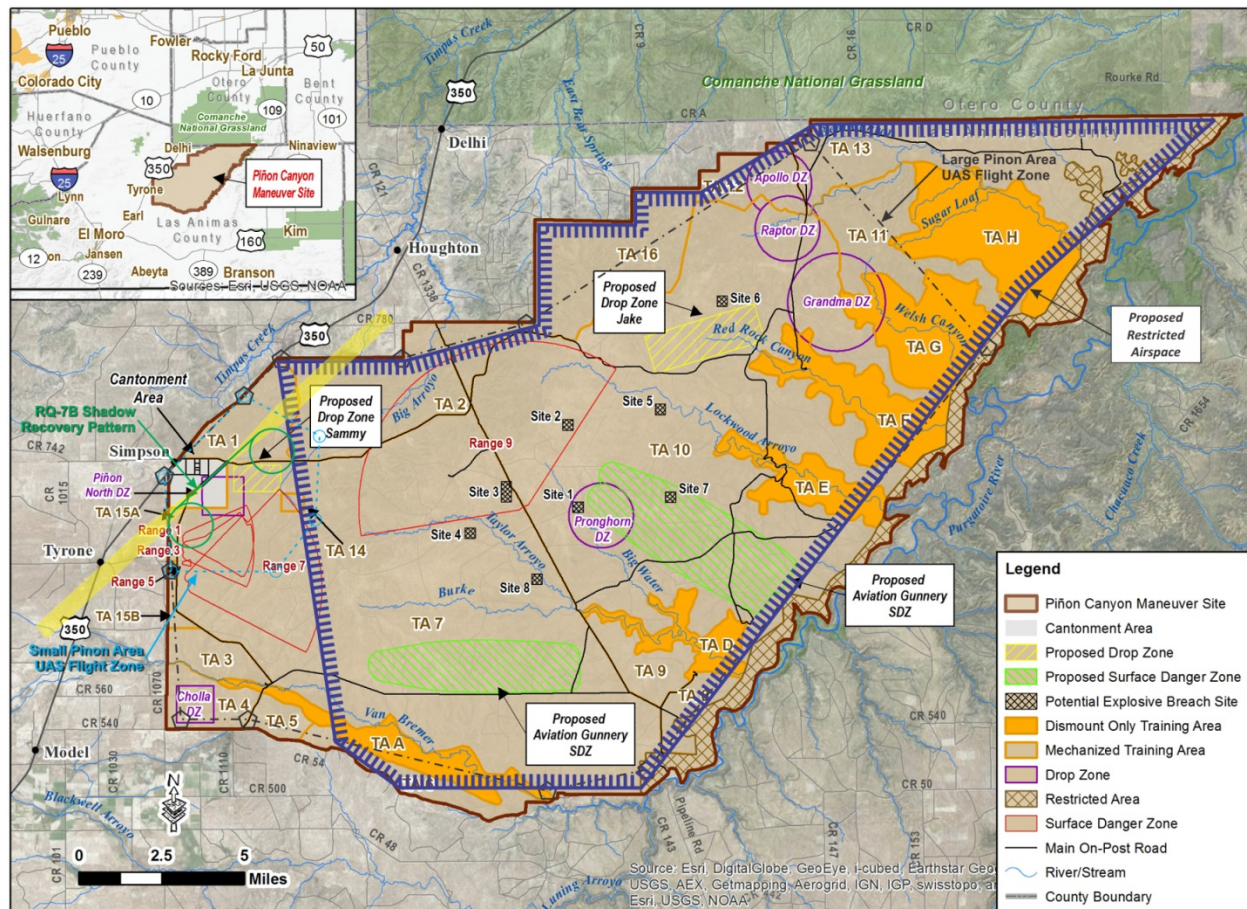
#### **3.11.2.3.1 ABCT, IBCT, and SBCT Training**

Section 3.11.2.2 discusses potential impacts regarding proposed BCT training activities. As analyzed within Proposed Action Alternative 1A, brigade maneuver training would result in individually negligible impacts to airspace. The impacts described for Alternative 1A would be the same for Proposed Action Alternative 1B. Potential impacts to airspace from readiness training using new tactics and equipment are discussed below.

#### **3.11.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

**Aviation Gunnery:** Under Alternative 1B, aircrews would be allowed to conduct non-dud producing rotary wing aviation gunnery on Range 9 and some yet-to-be-established ranges at PCMS, if airspace were reclassified as RA. This would include AH64 and OH58 20-mm and 30-mm on-board automatic cannons, .50 caliber door mounted guns, and handheld door guns into existing live-fire ranges. It would also include 2.75-inch non-explosive training rockets to be fired into two newly established live-fire ranges. Refer to Figure 3.11-10 for all existing and proposed ranges and their relationship to the proposed RA boundary. These ranges would be established for AH64 and OH58 rotary wing aircraft to fire Blue Spear 2.75-inch rockets at targets from hover position. Running fire and dive fire would not be allowed as there is insufficient room for the larger SDZ associated with those activities. SDZs have been computer generated by Range Operations using the Range Manager's Toolkit (RMTK) automated system based on an angle of fire between 2 and 18 degrees from an altitude of between 20 and 300 feet AGL, as defined by 4th ID G3 Aviation. Targeting would be visual and by both ground and aerial laser designators.





**Figure 3.11-10. PCMS Ranges and Proposed Restricted Airspace**

MOUT 11B is located in the left-middle of the left lane of the eastern range. Coordination with Range Operations would be needed to ensure that the entire range is clear before live-fire activities would commence. These PCMS facilities could potentially be damaged by flying debris or shrapnel from rocket fire. Additionally, roads 4, 4A, and 1B traverse the proposed eastern range. Security personnel or road closure equipment (gates and fences) would be necessary to close these PCMS roadways prior to range activity. There also exists an overhead power line that traverses the eastern range approximately halfway along the firing lane, roughly parallel to Road 4A. There are no known protections for this structure, which could be damaged by flying debris or shrapnel. Both the western and eastern ranges have firing points located just beyond the underground gas line that traverses PCMS from the southwest to the northeast. While this does not pose an immediate threat, it could be an ignition source from rocket back-blast if a gas leak were to occur at a point near the firing line. No above-ground gas line service structure should be located anywhere near either SDZ. Additionally, if rockets are fired from the minimum floor altitude of just 20 feet AGL, there exists a moderate potential for wildfire ignition from the back-blast of rocket launch at fire angles of less than 5 degrees. This area of the range should be maintained free of ignitable debris.

It is anticipated that there will be only a minor impact on airspace use due to aviation gunnery activities, primarily associated with rocketry live-fire. This impact would affect only internal military traffic with no impact to public safety outside of the RA. Aviation gunnery, however, would potentially effect PCMS assets and infrastructure located within the proposed SDZs.

**Flare Training:** Under Alternative 1B, aircrews would be allowed to utilize techniques such as evasive maneuvering and the deployment of flares. The deployment of flares is allowed outside of RA but must be conducted at an altitude of no-less than 1,500 feet AGL if over a military training range, and between 1,500 and 2,000 feet AGL if over public or private property. This is to ensure that the flares extinguish prior to ground contact to avoid starting wildfires. Very rarely, a flare will fail to ignite. Once this device makes ground contact it is considered unexploded ordnance (UXO) and is immediately retrieved and destroyed. Evasive maneuvers would be conducted within the warning protections provided by the MOA.

The use of flares would have a moderate impact on airspace use if conducted outside RA and outside of an active MOA. It would have a minor impact if conducted outside RA but within an active MOA, or if conducted inside RA due to the slight potential for wildfire ignition from low altitude drops.

### 3.11.2.3.3 Electronic Jamming Systems

According to AR 95-2 *Aviation, Section III Special Use Airspace, Subsection 4-13 Activities Requiring Restricted Airspace*, “dropping of chaff and some electronic countermeasures” requires RA due to the hazards of the activity to non-participating aircraft. Electronic jamming systems being considered under Alternative 1B have the potential to negatively impact airspace use<sup>1</sup>. If not carefully controlled, EW devices can exhibit unwelcome side-effects known as ‘electronic fratricide’ by polluting airwaves to such an extent that communications and navigation equipment fail to operate properly. A lack of communication during training exercises can have serious consequences. For example, a CFA requires radio contact to call for cease fires when necessary. If radios do not function properly due to an on-going EW exercise, this could put military and civilian personnel and equipment at risk.

Jamming devices have also been known to interfere with UAS and UGV navigation. EW conducted within RA could affect non-participating aircraft if EM radiation were to escape the bounds of the RA envelope. The effective distance of these devices could be used to establish safe zones well within the RA boundary for their deployment. This would not, however, provide any protections for military aircraft and personnel using radio frequency devices. Nearly every safety measure employed on the range uses radio frequency devices.

These potential hazards present a moderate risk of negative impacts to training operations, personnel and equipment safety, aircraft operations, and could disrupt any activity using radio frequency devices.

### 3.11.2.3.4 Laser Targeting

The use of Class 3B and Class 4 laser target designators is proposed as part of Proposed Action Alternative 1B. RA is required for the use of these devices. Examples of Class 3B laser designators include the handheld Mini Integrated Pointing Illumination Module (MIPIM) and the rifle mounted DBAL-A2 laser designator and illuminator. Examples of Class 4 laser devices are on-board target designators, such as the Target Acquisition and Designation Sights (TADS) Pilot Night Vision System (PNVS) of the AH-64 Apache, and the mast mounted sight (MMS) sensor suite of the OH-58 Kiowa. Ground vehicles also have similar high-powered laser designators that would be deployed under this scenario. Recent upgrades to the RQ-7B

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<sup>1</sup> Other forms of electronic jamming systems also have the potential to disable communications, navigation, and radar equipment. Frequency spectrum GPS jamming devices pose the greatest threat to flight safety, especially to aircraft that rely heavily on GPS-based tracking and navigation. GPS jamming could disable these systems, causing aircraft to go off-course or not have accurate position readings. While these systems are not being considered under the Proposed Action alternatives, they are currently utilized at PCMS.



Shadow UAS have allowed for laser designator devices to be deployed from these aircraft as well.

Operational procedures and dampening equipment help prevent laser beams from escaping the installation boundaries and inadvertently affecting non-participating aircraft. Laser use would not be restricted to any one part of PCMS. Instead, units would develop training scenarios depicting areas of operation for lasing, including LSDZs that apply during the course of the operations. These operations would target ground objects for laser guided munitions. Inadvertent sky exposure, while possible, would be unlikely due to careful planning and strict procedural protocol, which includes the removal or masking of any reflective surfaces that might redirect laser beams outside of controlled airspace. The MOA surrounding the proposed RA also provides an additional distance buffer to accidental exposure.

It is anticipated that use of laser targeting devices within RA would pose only a minor impact to airspace use in the ROI when operational procedures are followed.

#### **3.11.2.3.5 Demolitions Training**

Under Alternative 1B, Soldiers would be allowed to detonate up to 25 pounds of explosives for training purposes within designated demolition areas of Training Areas 7 and 10. Refer to Figure 3.11-10 for identification of the demolition areas and associated SDZs. This activity is dependent upon establishment of RA.

A no-fly-zone, commensurate with the ground plane SDZ extending to the vertical limit of the RA (10,000 feet above MSL), should be established when detonations occur. If this protocol were followed there would be no impact to airspace use from this activity. If these protocols were not followed, overflights of military aircraft during detonation could disrupt flights and potentially damage aircraft and/or cause injury to aircrews. There would be no threat or impact to public airspace use outside of the proposed RA as all activities would be confined within a safe distance of the installation and RA boundary. It should be noted, however, that depending upon the frequency of occurrence compacted by the number of demo areas and their disassociated configuration, demolition activities could result in operational conflict due to excessive loss of airspace within the RA.

#### **3.11.2.3.6 Airspace Reclassification**

Under Proposed Action Alternative 1B, Fort Carson would work with the FAA to establish RA over a portion of PCMS (see Section 2.2.3.7, Airspace Reclassification). This airspace would extend from surface up to 10,000 feet above MSL and would encompass all but approximately 137 square kilometers (33,853 acres) of the western edge of the installation. Considering an average ground plane at 5,400 feet AGL, this would allow for an effective ceiling of 4,600 feet AGL. The MOA would most likely be activated whenever the RA is active.

The “remainder” area not covered by the proposed RA is in response to an existing ILS missed approach pattern for Perry Stokes Airport (TAD). Refer to Section 3.11.1.2.8, Civilian Airfields, for details of this airport. Personnel from Range Operations, BAAF Airspace Manager, 4<sup>th</sup> CAB, 10<sup>th</sup> Special Forces and the Perry Stokes Airspace Manager recommended that the missed approach pattern be reviewed by the DAR and FAA for possible alteration, allowing the expansion of the RA to the extent of the land holdings of PCMS, or that a separate RA be established over this segment of airspace that could be activated or deactivated independently.

The Piñon Canyon LZ is located in the area not covered by the proposed RA. Currently, all Shadow L/R is conducted from this airfield, which would not relieve the burden of acquiring FAA-issued COA and the requirement for ground observers and chase planes for these flights during launch, recovery, and at all times outside of RA. All other air activities emanating from

the PCMS cantonment would likewise be unprotected by RA, remaining consistent with current operations. Additionally, Ranges 1-7 lie outside of the proposed RA, thus limiting their capabilities.

Establishing RA would allow the government to conduct training not otherwise allowed in unprotected airspace, such as aviation gunnery including air-to-ground rocket fire, door gunnery, close air support (CAS); medical evacuation (MEDEVAC); flare training; laser target designation; and electromagnetic countermeasures such as IED jamming and frequency spectrum GPS jamming. An extended RA (to the western boundary of the installation) would improve training activities at Firing Ranges 1-7, as well as cargo airdrops and parachute jump training at the PCMS LZ, Piñon North DZ, and Cholla DZ. Activation of the RA would support a variety of activities deemed hazardous to non-participating aircraft.

The establishment of RA over PCMS would temporarily take away navigable airspace from private, commercial and recreational pilots while the RA is activated. Usage of the RA is expected to be continuous during training, 24 hours per day, 4-5 week training cycles, and 4-5 training cycles per year. This works out to a maximum of 25 weeks per year. The proposed RA is approximately half of the overall area of the Piñon Canyon MOA already established (refer to Figure 3.11-9). While this MOA does not restrict non-participating air traffic through the area, it effectively redirects traffic around or over those activities when activated by proclaiming a presence of high-military usage. Activation periods for the proposed RA would be similar or slightly increased due to improved usability relative to use of the existing MOA. When RA is activated, this may negatively impact the following:

- Presently, Victor Routes V81 and V169 traverse the MOA and IFR traffic is rerouted over the MOA (over 10,000 feet above MSL) when it is activated. This function would remain unchanged for the RA if established, resulting in no new impacts.
- One private airfield, Jecan Airport (06CO), exists under the MOA but would be well outside of the RA at a distance of approximately 11.3 kilometers (6.1 NM). Refer to Section 3.11.1.2.8, Civilian Airfields, for details of this airport. The distance from PCMS is adequate for launch and recovery of all aircraft types that frequent Jecan Airport. Traffic in-bound and out-bound would travel to the southeast, away from PCMS. This would be consistent with existing flight activity while the MOA is activated since the airport exists within the Piñon Canyon MOA.
- The MTR that traverses the site includes VR-1427 with traffic from surface up to 1,500 feet AGL for a width of five miles either side of center, and for IR-409 traffic from 1,500 feet AGL up to 18,000 feet above MSL for the same width along the same line. Refer to Section 3.11.1.2.7, Military Traffic Air Routes, for more information. As these are training routes for military aircraft, there would be little disruption of their use due to the establishment of RA. Air traffic on the IR route would require a handoff of aircraft control from Denver ARTCC to BAAF ATC as aircraft pass through the RA and then back as aircraft exit. Aircraft on the visual route would also need to contact BAAF ATC before entering the RA but would not have contact with the Denver Center ARTCC.

For these reasons, the establishment of RA over PCMS would have only a minor impact to airspace use.

#### **3.11.2.3.7 DZ Development**

According to Range Operations, there are six active DZs on PCMS. Refer to Section 3.11.1.2.2, Drop Zones, for a detailed description of each. Alternative 1B would establish two new DZs (Refer to Figure 2.2-4, Proposed New Aviation Gunnery Surface Danger Zones and Drop Zones):

- Sammy DZ - This DZ is a rectangular area immediately east of the Piñon North DZ and the airfield, parallel to Road 1. Hazards include firing ranges to the south and east, barbed wire fences and several radio towers further out. This would be a random approach DZ and would require coordination with ranges to ensure a cease fire has been called prior to approach. Potential conflict is also possible with the Piñon North DZ due to proximity.
- Jake DZ - This is a large rectangular DZ located west of the Grandma DZ along Road 1. Hazards include a portion of the buried gas pipeline and an above-ground support structure. This would be a random approach DZ. Ground conditions are similar to those of the Grandma DZ.

These facilities do not require RA and would not cause the activation of RA. Airdrops would be similar in nature to those conducted at the existing surrounding DZs, and therefore, would have no additional impact to airspace use. Coordination of all military air and ground operations is necessary for the safe use of these facilities. All manned and unmanned L/R activity at the PCMS LZ should cease when the Sammy DZ is active.

### 3.11.3 Mitigation Measures

No mitigation measures would be required; impacts from the Proposed Action Alternatives 1A and 1B would be negligible to moderate. Compliance with existing regulations and permits would be required for activities associated with training proposed in the future. Adherence to Installation Management Plans would guide Proposed Action activities, as it does for current training and operations. There are specific actions that could improve safety, economy and efficiency of operations under the Proposed Action alternatives.

- To reduce the risk of laser usage to non-participating aircraft beyond established protocol, laser fire would be directed away from known airport approach patterns, particularly busy or nearby airports, including Pueblo Memorial Airport (PUB) and the Perry Stokes Airport (TAD).
- Establishment of ROZs at select areas throughout the range would allow for unencumbered operation and training on these airframes without fear of mid-air conflict or interruption due to incoming traffic. Since Ravens are not fitted with location devices, it is up to ground crews and aircraft operators to visually detect and avoid one another. Established ROZs would eliminate this need and allow for multiple consecutive activities.
- Establishment of flight paths around and through the range would help organize and control VFR traffic, thereby reducing the burden of separation on BAAF ATC. Single direction routes also help reduce the possibility of mid-air conflict, making all training activities safer.
- A ceiling should be established for defined demolition areas whereby limited blast effects have a negligible effect to aircraft, allowing for a reduction in the loss of navigable airspace within the RA during demo activities, as opposed to establishing a temporary flight restriction (no-fly-zone) over the area from surface up to the proposed RA ceiling of 10,000 feet above MSL.
- Electronic Warfare training zones should be established based specifically upon the effective range of each device utilized or the worst case scenario device to be used. This should be located a safe distance away from the RA boundary to protect non-participating aircraft and it should be identified on range maps as a permanent no fly-zone unless EW operations are sporadic. In those cases, a no-fly-zone can be established and published via NOTAM prior to activation.

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## 3.12 Facilities and Utilities

### 3.12.1 Affected Environment

PCMS is a training installation with a small cantonment area and minimal utility services. Utilities at PCMS are operated in accordance with the base operations performance work statement and guided by the DPW. Potable water resources are managed according to Safe Drinking Water Act (SDWA) guidelines. Energy reduction efforts are guided by energy conservation programs, detailed in the Energy Management Plan, and installation policy letters. The Energy Management Plan supports the Energy Policy Act (EPACT) of 2005, which requires Federal installations to meet multiple goals in the areas of energy conservation, such as the reduction of GHG emissions, the implementation of renewable energy, and water conservation. Key resources for Army utility management include:

- Safe Drinking Water Act
- CWA, National Pollutant Discharge Elimination System (NPDES)
- EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*
- EPACT 2005
- AR 420-1, *Army Facilities Management*

Solid waste management at Fort Carson is conducted in compliance with all applicable regulations. Key resources for Army solid waste management include:

- Resource Conservation and Recovery Act (RCRA)
- EPA's non-hazardous solid waste regulations codified in 40 CFR Parts 240-258
- EO 13423 *Strengthening Federal Environmental, Energy, and Transportation Management*
- AR 200-1, *Environmental Protection and Enhancement*
- 10 USC 2577, Disposal of Recyclable Materials
- DoD Instruction 4715.4, *Pollution Prevention*
- 6 Code of Colorado Regulations (CCR) 1007-2, Part 1, *Regulations Pertaining to Solid Waste Sites and Facilities*

#### 3.12.1.1 Potable Water

Potable water for PCMS and the surrounding area is contracted through the City of Trinidad. The City's source of water is North Lake Reservoir; Monument Lake Reservoir is a secondary source. Both reservoirs are located approximately 30 miles west of Trinidad, and within two miles of each other. The Western Regional Climate Center reported drought conditions for Las Animas County, where these reservoirs are located, to be in abnormally dry, moderate and severe drought status in August 2014. The drought status worsened from west to east. The reservoirs were located in an abnormally dry classified location and PCMS was in a severe drought status. These conditions are updated weekly by the U.S. Drought Monitor, which is a weekly map produced jointly by the National Oceanic and Atmospheric Administration, the USDA, and the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln.

PCMS's contract with the City of Trinidad allows delivery of up to approximately 2,700,000 cubic feet (20,200,000 gallons) of water annually. Fort Carson purchases treated potable water for use in the cantonment area as well as for Soldier use in training areas, firefighting, and some stock tanks for wildlife at PCMS (Fort Carson, 2013c). The potable water enters the installation west of the cantonment area via a 300-gallon per minute 8-inch water supply pipeline adjacent to US 350 (John Gallup & Associates, 2009). After the water is delivered to PCMS, it is chlorinated and stored in a 150-foot elevated storage tank with a 500,000-gallon capacity. From the storage tank, potable water is distributed to the cantonment area via approximately 14,000 linear feet of underground water line (John Gallup & Associates, 2009) and to the training areas by water truck. The PCMS water system is classified as a Group B system, which is defined as a water system with less than 15 connections or serving fewer than 25 people per day for 60 or more days per year. The entire system is owned and operated by the Army.

Fort Carson conducted an infrastructure capacity analysis for PCMS in 2009. The analysis states that Army Technical Manual 5-813-1: *Water Supply Sources and General Considerations* suggests an allowance of approximately 150 gallons per capita per day for armored divisions in permanent construction. This estimate includes water used for laundry, washing vehicles, and limited watering of planted and grassed areas, along with typical domestic use. Interviews with installation engineers indicated that the estimate of 150 gallons per capita per day is probably very high for this type of site. Because of time spent downrange and the minimal, austere nature of the facilities on-site, the installation engineers and users estimated the actual water use to be closer to 35 gallons per capita per day (John Gallup & Associates, 2009). A summary of water flow rates from the analysis is included in Table 3.12-1.

**Table 3.12-1. Summary of PCMS Water Flow Rates**

| <b>Loading Condition</b> | <b>Average Users</b>                            | <b>Average Daily Flow<br/>(35 Gallons/Capita/Day)</b> | <b>Average Daily Flow<br/>(150 Gallons/Capita/Day)</b> |
|--------------------------|-------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------|
| Existing                 | 15                                              | 525                                                   | 2,250                                                  |
| Capacity                 | 3,333 to 14,285 persons<br>depending upon usage | 500,000                                               | 500,000                                                |

Source: John Gallup & Associates, 2009

According to the analysis, the potable water system is adequate to support approximately 14,285 people based on a water consumption rate of 35 gallons per person per day and other installation-related support activities (such as dust control and emergency fire suppression). The water tank and potable water distribution system in the cantonment area are operating within capacity and would support water demands from additional training units.

### **3.12.1.2 Wastewater**

The wastewater and stormwater collection systems at PCMS are comprised of combined stormwater and raw sewage treatment/oxidation ponds originally constructed in 1985. There are approximately 7,000 linear feet of 8-inch and 12-inch diameter pipe that conveys wastewater and stormwater to a combined treatment system located in the southwestern corner of the cantonment area. The system is operating at levels well below capacity (John Gallup & Associates, 2009). In 2006, a project was completed that subdivided and re-lined the ponds to accommodate the small daily load from the site, while still maintaining the capacity to accommodate occasional large loads. The modified system was designed for an average daily flow capacity of 10,052 gallons per day (15 gallons per capita per day), which is consistent with mostly administrative use for full-time occupants (John Gallup & Associates, 2009). The

wastewater ponds do not have a discharge permit because the ponds are designed to be non-discharging.

Not all facilities within the cantonment area direct their sanitary wastewater to the treatment ponds. The guard trailer, HQ building, and the chlorination building are within the cantonment area, and wastewater at those facilities is treated using septic systems. The septic system for the HQ building, Building 300, was upgraded in 2006. Most facilities outside of the cantonment have septic systems and leach fields. Portable toilets are used in the training areas when septic systems are not available (such as during training activities in the training areas) (John Gallup & Associates, 2009).

Wastewater may be generated from other training or life support activities such as field-expedient meals, showers, or laundry services. Wastewater from these activities is collected in tanks and removed via vacuum trucks to an approved disposal facility.

Vehicle washing is prohibited in training areas, but may be conducted just outside of the tree break area surrounding the cantonment area along MSRs 1 and 2. Prior coordination must be made with Range Operations for water truck services, if required.

### **3.12.1.3 Stormwater**

The existing stormwater infrastructure at PCMS utilizes overland flow and low impact development features within the landscape. A central stormwater collection pipe exists in the vicinity of the railyard, however this is the only piped stormwater conveyance. Although Fort Carson has coverage under a Municipal Separate Storm Sewer System (MS4) permit, PCMS is not included. In order to better manage the stormwater program at PCMS, an SWMP that follows general provisions of the MS4 permit was developed in 2012. The program's main objective is to protect surface waters from pollution. Without treatment, stormwater runoff can carry physical, chemical, and biological pollutants to storm sewer systems or directly to a pond, creek, river, or wetland, causing water quality impairment. Currently, permitted stormwater coverage for PCMS is limited to the cantonment area under the Multi-Sector General Permit (MSGP) (USEPA, 2000) for industrial activities. Construction activities that disturb one acre or more of land at PCMS are also required to obtain permit coverage under the Construction General Permit (CGP) (USEPA, 2012). Provisions of the CGP and MSGP are outlined below.

FC Regs 350-4, *Piñon Canyon Maneuver Site*, and 350-10, *Maneuver Damage Control Program* discuss training management at PCMS and maneuver damage at both PCMS and Fort Carson, respectively. Both regulations address minimizing impacts to non-construction related stormwater activities either directly or indirectly during training events.

#### **3.12.1.3.1 Construction General Permit**

Construction projects at PCMS with one acre or more of disturbance are required to obtain permit coverage under the CGP. This includes the submittal of an NOI to the USEPA by the construction contractor. In addition, the contractor is required to develop and implement an SWPPP and to comply with BMPs set forth in the PCMS SWMP. All disturbed areas must be stabilized prior to the submittal of a Notice of Termination (NOT). This includes the re-establishment of permanent vegetation to replace previously disturbed or removed vegetation. An NOT cannot be filed until 70 percent or greater density of the previously existing vegetation is re-established and/or other non-vegetative erosion controls due to the semi-arid climate of the region are installed. Construction projects are monitored by environmental personnel stationed at PCMS as well as those from the Stormwater Program office at Fort Carson for permit compliance.



### 3.12.1.3.2 Multi-Sector General Permit

The MSGP (USEPA, 2000) provides facility-specific requirements for many types of industrial facilities within one overall permit. The permit outlines steps that facilities must take prior to being eligible for permit coverage, including development and implementation of an SWPPP. Fort Carson has developed the SWPPP for PCMS. Industrial activities covered under this permit are the motorpool, sewage lagoons, and the re-fueling point. The SWPPP will be updated as necessary to reflect changes in training at PCMS.

### 3.12.1.3.3 Fort Carson Regulation 350-4, Piñon Canyon Maneuver Site

Fort Carson addresses stormwater management and spill prevention practices among numerous other topics in this regulation. Key requirements include the appointment and presence of a certified Maneuver Damage Control Officer (MDCO) for all maneuver training events at PCMS. In addition to unit commanders, the MDCO oversees the prevention, identification, reporting, and mitigation of maneuver damage for the unit during training exercises. MDCOs also train unit personnel on proper preventive and response practices to minimize impacts and respond expeditiously should an event occur.

Preventive practices employed for stormwater management at PCMS include Range Operation's categorization and announcement of soil conditions. These categories communicate potential maneuver impacts and suggest guidance to unit commanders and MDCOs. Soils are ranked daily as green, amber or red:

- Green: Soils are dry (no restrictions).
- Amber: Soils are becoming wet. Training should be limited to trails, roads, and dismounted operations.
- Red: Vehicles are making significant tracks in the soil (three inches deep). Training should be limited to movement on primary MSRs and dismounted-only operations.

Fort Carson categorizes training lands at PCMS into three categories that are used to communicate and minimize potential impacts to stormwater. These include Limited-Use Areas, Off-Limits Areas, and Dismounted-Only Training Areas. All of these are described in more detail in Section 3.12.1.3.4, Fort Carson Regulation 350-10, *Maneuver Damage Control Program*.

Speed limits are not to exceed 15 miles per hour in maneuver areas for both environmental and safety reasons. During cross-country mounted maneuver training, units may only cross streams at designated stream crossing sites and may not use designated no-drive/no-dig areas.

The location of petroleum, oil, and lubricant (POL) field storage facilities must be coordinated through Range Operations and DPW. These sites must be inspected prior to placing into operation. The criteria associated with these areas are specific:

- POL will not be stored within 100 meters of any waterway.
- POL will not be stored in areas with a slope greater than 1-20 feet.
- POL facilities will be subject to periodic inspections to ensure no spillage and seepage has occurred. If a spill does occur, it must be cleaned up immediately. Any POL spill in excess of five gallons, or any hazardous waste substance that enters a drain, ditch, or waterway, must be reported to Range Operations immediately.
- Waste POL products will not be burned, dumped in trash containers, deposited at trash collection points, spread on the ground, or dumped in sewers, ditches, or streams.

Additional and more detailed maneuver damage and stormwater control measures are described in FC Reg 350-10.

#### **3.12.1.3.4 Fort Carson Regulation 350-10, Maneuver Damage Control Program**

This regulation implements Fort Carson's MDCP at both Fort Carson and PCMS. As mentioned previously, units are required to train, certify, and have present an MDCO for all maneuver training events at PCMS. MDCOs must attend a MDCP course at least annually to remain certified.

Military assembly areas, excavation training, and the movement of vehicles are the major sources of maneuver damage. Guidelines for minimizing maneuver damage in accordance with FC Reg 350-10 are presented below:

- Maximize use of existing routes and trails. Avoid creating new routes and trails.
- Do not damage wetlands; find an existing road.
- Erosion control structures, which are covered with boulders, are off limits to maneuvers. Erosion control structures with no boulders are designed for vehicles to use when dry.
- Units may drive through limited-use areas on existing routes or trails, and may conduct dismounted training off the routes within them. Units cannot dig, bivouac, or maneuver vehicles off the routes or trails in limited-use areas. Limited-use areas are surrounded by limited-use signs. These areas are the most impacted sites in the training areas, and are being rehabilitated for continued, sustainable training use or for other administrative reasons such as test, experimentation, and evaluation. Most limited-use areas are in limited-use status for three years, but are pulled out of this status as soon as possible after the site has recovered and the vegetation can once again withstand military training.
- Training in off-limits areas is prohibited. These areas are designated on overlays and are marked with off-limits signs. Some of these areas contain serious safety hazards and others are protected by Federal law.
- Training in dismounted-only training areas must be limited to dismounted training activities only and all ground disturbing activities must be requested through DPTMS, Range Division for coordination and permission in advance of the training exercise.

Units must use their own personnel, communication, engineering, and transportation assets for maneuver damage repair. Excavations, such as tank ditches, vehicle damage, or individual fighting positions must be backfilled, leveled, and compacted before a unit is granted clearance from maneuver areas. Units may not put any foreign debris in any holes prior to backfilling. Units must level trenches, ruts, and any foxholes or individual fighting positions. Units must also kick in and level longer track ruts caused by tracked vehicle maneuver, and mounds or ridges of dirt more than 12 inches high.

#### **3.12.1.4 Solid Waste**

Solid waste pickup at PCMS is managed via contract, and wastes are transported to appropriately permitted disposal facilities in Trinidad. Refuse and construction-related solid wastes are managed by DPW. Solid waste generated in the training areas is collected and returned to the cantonment area for disposal. From the cantonment area, solid wastes are transported to appropriately permitted facilities.

Recycling is currently being accomplished on PCMS with designated containers for aluminum cans, plastics and cardboard.

### 3.12.1.5 Energy, Heating, and Cooling

The electrical supply system serving PCMS is supplied by San Isabel Electric Association, Inc., consisting of one substation located in the cantonment area, which is fed from an overhead 115-kilovolt (kV) pole line and contains a 2,000-kV ampere (kVA) transformer. PCMS is fed by way of both overhead aerial and underground distribution circuits throughout the post. Additionally, the Southeast Colorado Power Association provides single phase power to an isolated portion of the northeast corner of the installation (John Gallup & Associates, 2009). The substation supplies electricity to the existing buildings in the cantonment through underground distribution lines located adjacent to the roads. The exact location and condition of these lines are not fully known.

The capacity of the existing transformer is 2,000 kVA, and the existing demand is 300 kVA; therefore, electricity demand at the site is below the design capacity of the existing transformer. The existing post electrical power distribution system is in good condition and is adequately serving the existing loads. The system appears to be well-maintained and to be constructed in accordance with current technology. No major deficiencies are known. Overall, the power system appears to be a reliable source of electric power.

Facilities in the PCMS cantonment area are currently heated by heating oil or propane. Heating oil and propane, transported to PCMS by truck, are stored in building-specified underground storage tanks (USTs). Distribution lines are not required as storage of these fuels occurs at the point of use. Heating oil is not used outside the cantonment area, and natural gas is not used at all at PCMS.

Colorado Interstate Gas (CIG), a subsidiary of El Paso Corporation, owns and operates a 10-inch diameter, high-pressure gas main that runs through PCMS from northeast to southwest (refer to utility line on Figure 2.2-10, Proposed New Aviation Gunnery Surface Danger Zones and Drop Zones). This gas main separates into two 8-inch mains before it exits PCMS. CIG has an easement for its gas lines, and it maintains the access road that extends the full length of the pipeline. Per FC Reg 350-4, this area is a no-drive/no-dig area and is off-limits. These areas are marked with fencing, protective signs, and the use of "Siebert Stakes".

### 3.12.1.6 Communications

The communication infrastructure at PCMS consists of fiber optic cables that enter the cantonment area from US 350. A project was completed in 2006 that included installing approximately 125 miles (201 kilometers) of fiber optic lines, six guyed communication towers, and equipment shelters (USAEC, 2011). A combination of towers and several equipment shelters at Pueblo Chemical Depot and Cedar Crest provide connectivity between Fort Carson and PCMS.

### 3.12.2 Environmental Consequences

This section provides a discussion of the environmental impacts to facilities and utilities that would result from the No Action and Proposed Action alternatives. A significant impact would occur if the Proposed Action Alternatives cause long term or frequent impairment of utility service to local communities, homes, or businesses. Table 3.12-2 provides a comparison summary of anticipated level of impacts.

**Table 3.12-2. Summary of Facilities and Utilities Impacts**

| Alternative                           | Negligible | Minor    | Moderate | Significant | Beneficial |
|---------------------------------------|------------|----------|----------|-------------|------------|
| <b>No Action</b>                      |            | <b>X</b> |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |          |          |             |            |
| ABCT Training                         |            | X        |          |             |            |
| IBCT Training                         |            | X        |          |             |            |
| SBCT Training                         |            | X        |          |             |            |
| Combined Elements <sup>a</sup>        |            | X        |          |             |            |
| <b>Proposed Action Alternative 1B</b> |            |          |          |             |            |
| ABCT Training                         |            | X        |          |             |            |
| IBCT Training                         |            | X        |          |             |            |
| SBCT Training                         |            | X        |          |             |            |
| Aviation Gunnery and Flare Training   | X          |          |          |             |            |
| Electronic Jamming Systems            | X          |          |          |             |            |
| Laser Targeting                       | X          |          |          |             |            |
| Demolitions Training                  | X          |          |          |             |            |
| UAS Training                          | X          |          |          |             |            |
| UGV Training                          | X          |          |          |             |            |
| Airspace Reclassification             | X          |          |          |             |            |
| DZ Development                        | X          |          |          |             |            |
| Combined Elements <sup>a</sup>        |            | X        |          |             |            |

a. Overall combined level of direct impact to utilities would be minor. BCT training would be intermittent and short term, but potable water use would surge during large training events. Additionally, solid waste and wastewater generation would increase temporarily, resulting collectively in slightly larger volumes per year. PCMS infrastructure, however, can handle all temporary increases regarding utilities based on contracted capacities. Negligible impacts are expected for stormwater as no construction is proposed and units would follow established FC regulations and policies during field training events. There would be no impacts on energy use and communications.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### **3.12.2.1 No Action Alternative – Continue Existing Mission and Training Operations at PCMS**

Under the No Action Alternative, no additional training activities would be required and existing site conditions would not be impacted. Potable water demands, wastewater generation and stormwater impacts would remain the same as current conditions. Solid waste generation, energy demands, and communication networks would not be affected under the No Action Alternative.

PCMS can supply up to 500,000 gallons of potable water per day. The previous ABCT configuration consisted of 3,757 Soldiers, which required approximately 131,495 gallons per day per training event; compared to the new ABCT configuration that requires approximately 162,925 gallons per day. The existing potable water storage tank can facilitate up to 14,285 people per day, which greatly exceeds the 4,655 Soldiers and support staff that are required of an ABCT-level training exercise at PCMS. Minor impacts of potable water use would continue.

Negligible impacts to wastewater would occur in the cantonment area and training lands under the No Action Alternative. Soldiers briefly consolidate within the PCMS cantonment and marshaling areas prior to traveling to their respective training sites. During these events, Fort Carson units contract for portable latrine services to be provided both in the cantonment area and throughout all training sites (Ford, 2014). Latrine services are provided daily, and all wastes are disposed of at an approved permitted wastewater treatment facility outside of PCMS. This practice does not increase wastewater discharge quantities at PCMS.

Negligible impacts to stormwater would be anticipated as a result of No Action Alternative. Units must comply with the PCMS SWPPP as required by the Multi-Sector General Permit. This permit requires the use of BMPs to mitigate stormwater impacts within the cantonment area. SWPPP training is included as a topic in Fort Carson's 40-hour Environmental Protection Officer (EPO) Course. An EPO is required to be present before any unit may train at PCMS. Relative to stormwater management in training areas, units must train, certify, and have present a trained MDCO during all training events. MDCOs are trained on appropriate stormwater pollution prevention practices and policies as well as maneuver damage mitigation techniques. MDCOs serve as the unit commander's authority to ensure the requirements of FC Regs 350-4 and 350-10 are adhered to during maneuver training events at PCMS. Some specific requirements of these regulations are described in Section 3.12.1.3, Stormwater. Overall impacts would be minor.

### **3.12.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

#### **3.12.2.2.1 ABCT, IBCT, and SBCT Training**

The establishment of a BCT-level training intensity limit using SMAs and Task Order Miles to complement the 4.7-month brigade-level training period duration would have no adverse impacts on facilities and utilities. Potential impacts from BCT training under Alternative 1A are further discussed below.

#### **Potable Water**

Minor short term impacts regarding increased water use would be anticipated as a result of Proposed Action Alternative 1A. The proposed brigade-level maneuver training under Alternative 1A, along with the new ABCT, IBCT, and SBCT configurations, would temporarily increase Soldier densities and potable water demands during training events.

As previously stated, the new ABCT configuration requires approximately 162,925 gallons of potable water per day, resulting in an increase of 31,430 gallons per day (an approximate 24

percent increase). The new IBCT configuration at PCMS would require approximately 150,360 gallons per day. The SBCT would require approximately 155,890 gallons per day, resulting in an increase of 24,395 gallons (an approximate 19 percent increase) per day, compared to the previous ABCT configuration which consisted of 3,757 Soldiers, and required approximately 131,495 gallons per day per training event. As previously stated, PCMS can supply up to 500,000 gallons of potable water per day. The potential use levels under Proposed Action Alternative 1A fall well below the 500,000 gallons per day capacity. The existing potable water storage tank can facilitate up to 14,285 people per day, which greatly exceeds the largest training exercise of 4,655 Soldiers and support staff that are required of an ABCT-level training exercise at PCMS. Overall impacts would be minor.

### **Wastewater**

Negligible impacts to wastewater would be expected in the cantonment area and training lands under Alternative 1A. Soldiers briefly consolidate within the PCMS cantonment and marshaling areas prior to traveling to their respective training sites. During these events, Fort Carson units contract for portable latrine services to be provided both in the cantonment area and throughout all training sites (Ford, 2014). Latrine services are provided daily, and all wastes are disposed of at an approved permitted wastewater treatment facility outside of PCMS. This practice does not increase wastewater discharge quantities at PCMS. Additional latrines would be provided to offset the increase in Soldier density as a result of brigade-level training.

### **Stormwater**

Negligible impacts to stormwater would be anticipated as a result of Proposed Action Alternative 1A. No construction is planned under this alternative; therefore an NPDES Construction General Permit would not be required. Additional vehicles at PCMS would likely increase the amount of contaminants introduced into the cantonment and training areas. These contaminants would include predominantly fuel, oils, lubricants, and sediments from leaks, drips, spills and erosion. Units, however, must comply with the PCMS SWPPP as required by the Multi-Sector General Permit. This permit requires the use of BMPs to mitigate stormwater impacts within the cantonment area. SWPPP training is included as a topic in Fort Carson's 40-hour EPO Course. An EPO is required to be present before any unit may train at PCMS.

Relative to stormwater management in training areas, units must train, certify, and have present a trained MDCO during all training events. MDCOs are trained on appropriate stormwater pollution prevention practices and policies as well as maneuver damage mitigation techniques. MDCOs serve as the unit commander's authority to ensure the requirements of FC Regs 350-4 and 350-10 are adhered to during maneuver training events at PCMS. Some specific requirements of these regulations are described in Section 3.12.1.3, Stormwater.

### **Solid Waste**

Minor short term impacts would be expected due to the Proposed Action Alternative 1A. The proposed brigade-level maneuver training under Proposed Action Alternative 1A, along with the new ABCT, IBCT, and SBCT configurations, would be anticipated to increase general refuse volumes commensurately. ABCT Soldier populations would increase from 3,757 to 4,454 Soldiers, an approximate 19 percent increase. IBCT Soldier populations would increase from 3,523 to 4,296 Soldiers, an approximate 22 percent increase. The SBCT has 4,454 Soldiers, which is 697 more than the 3,757 of the ABCT it replaced at Fort Carson (an approximate 19 percent increase).

General refuse is picked up and hauled to an approved landfill by a contractor. Fort Carson would increase the number of dumpsters and recycling receptacles at PCMS to accommodate the temporary surge in Soldier density.

## **Energy, Heating, and Cooling**

No impacts would be anticipated for energy, heating, and cooling under Proposed Action Alternative 1A. There are a limited amount of permanent structures within the cantonment area. If used, these structures could only accommodate a few hundred Soldiers at maximum capacity. The remainder of Soldiers would use tentage for brief life support activities within the cantonment area. Electricity for non-permanent structures would be temporarily produced by generators organic to each unit.

The CIG-owned high-pressure gas main that runs through PCMS from northeast to southwest would not be impacted from the addition of an ABCT maneuver battalion during training events. FC Reg 350-4 classifies this area as off-limits to maneuver training. The area is, therefore, marked as a no-dig/no-drive area.

## **Communications**

There would be no impacts to the communications infrastructure at PCMS under Proposed Action Alternative 1A. Units would continue to communicate using their respective communication equipment, which would not require compromising PCMS radio towers or underground fiber optic cables.

### **3.12.2.3 Proposed Action Alternative 1B - Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

#### **3.12.2.3.1 ABCT, IBCT, and SBCT Training**

Section 3.12.2.2, Proposed Action Alternative 1A, discusses the potential for impacts regarding proposed BCT training activities. As analyzed within Proposed Action Alternative 1B, brigade maneuver training and reconfiguration would result in individually minor impacts to facilities and utilities.

#### **3.12.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

#### **Potable Water**

There would be negligible impacts to potable water under Proposed Action Alternative 1B. Rotary wing and fixed wing aircraft crews would most likely not perform bed-down activities at PCMS due to the close proximity of the training site to Butts Army Air Field and other air bases located within the region of interest. Should aviation units conduct training at PCMS for extensive periods, they would deploy their support elements and conduct bivouac activities similar to other combat units. In these scenarios units would draw their potable water supplies from PCMS and distribute via water buffalo or similar equipment. Aviation units are considerably smaller than ground combat units, and therefore would have less of an impact. During combined arms training events, aviation units would have a negligible additive effect on potable water demands. The total Soldier density on PCMS during these combined arms training events is anticipated to be less than 6,000 Soldiers at any one time. The existing potable water storage tank at PCMS can facilitate up 14,285 people per day.

#### **Wastewater**

Negligible impacts to wastewater would be expected in the cantonment area and training lands under Proposed Action Alternative 1B. Soldiers briefly consolidate within the PCMS cantonment and marshaling areas prior to traveling to their respective training sites. During these events, Fort Carson units contract for portable latrine services to be provided both in the cantonment area and throughout all training sites (Ford, 2014). Latrine services are provided daily, and all wastes are disposed of at an approved permitted wastewater treatment facility outside of PCMS. This practice does not increase wastewater discharge quantities at PCMS.



### **Stormwater**

Negligible impacts to stormwater would be anticipated under Alternative 1B. Aviation gunnery training would consist of firing inert 2.75-inch rockets that could potentially result in short term, negligible indirect impacts. As rockets impact training area surfaces, they could disturb vegetative root systems and loosen soils. These conditions could facilitate a slight increase in sedimentation being deposited into watersheds through sheet flow events.

Flare training would have negligible impacts on stormwater quality under Alternative 1B. As discussed in Section 2.2.3.1, Aviation Gunnery (non-explosive) and Flare Training, the flares are designed to burn out before reaching the ground and would be dispatched at 1,500 feet AGL or greater, so no direct adverse impacts are anticipated.

### **Solid Waste**

Negligible impacts would be expected for solid waste under Alternative 1B. Aviation units conducting 2.75-inch rocket live fire and flare use activities would not appreciably increase the generation of solid waste at PCMS. These units are much smaller than BCTs and would have considerably less relative impacts should they bed-down or bivouac at PCMS.

### **Energy, Heating, and Cooling**

No impacts would be anticipated for energy, heating, and cooling under Proposed Action Alternative 1B. Aviation units are considerably smaller in size than BCTs and would have even less of an impact on utilities should they conduct bed-down or bivouac activities at PCMS.

The existing power lines located within the proposed SDZ in Training Area 10 (see Figure 2.2-10. Proposed New Aviation Gunnery Surface Danger Zones and Drop Zones) are buried; therefore, there would be no impacts on this utility from training as described for Alternative 1B.

### **Communications**

There would be no impacts to the communications infrastructure at PCMS under Proposed Action Alternative 1B. Units would continue to communicate using their respective communication equipment, which would not require compromising PCMS radio towers or underground fiber optic cables.

#### **3.12.2.3.3 Electronic Jamming Systems**

Use of electronic jamming systems would have no adverse impact to water, wastewater, stormwater, solid waste, or energy.

### **Communications**

There would be no direct or indirect adverse communication impacts on PCMS and adjacent properties. Jamming systems can block all radio communications on any device that operates on radio frequencies within its range (i.e., within a certain radius of the jammer) by emitting radio frequency waves that prevent the targeted device from establishing or maintaining a connection (FCC, 2014). DoD-approved frequencies would only be used for this type of training at PCMS and would not interfere with civilian and commercial frequencies.

#### **3.12.2.3.4 Laser Targeting**

No additional utilities would be used or waste generated during laser targeting training; therefore, there would be no adverse effects.

#### **3.12.2.3.5 Demolitions Training**

Negligible impacts would be anticipated as a result of demolitions training under Proposed Action Alternative 1B. Infrequent use of 25-pound or less explosives could disturb vegetative

1 root systems and loosen soils. These conditions could slightly increase the amount of sediments  
2 deposited into watersheds through sheet flow events, but such events would occur infrequently.  
3 Negligible increases of solid waste would be generated from packaging. Demolitions training  
4 would have no adverse impact to potable water, wastewater, energy, and communications.

#### 5 **3.12.2.3.6 UAS Training**

6 No utilities would be used or waste generated during UAS training; therefore, there would be no  
7 adverse effects. Any UAS platoon's utilities use would be accounted for under BCT training as  
8 they are smaller units of BCTs.

#### 9 **3.12.2.3.7 UGV Training**

10 No utilities would be used or waste generated during UGV training; therefore, there would be no  
11 adverse effects.

#### 12 **3.12.2.3.8 Airspace Reclassification**

13 No utilities would be used or waste generated from airspace reclassification during laser  
14 targeting training; therefore, there would be no adverse effects.

#### 15 **3.12.2.3.9 DZ Development**

16 DZ development and training would have no adverse impact to water, wastewater, stormwater,  
17 energy, and communications. Negligible increases of solid waste would be generated during  
18 woody vegetation removal and vegetation maintenance of the sites. These materials would be  
19 composted on site.

### 20 **3.12.3 Mitigation Measures**

21 No mitigation measures would be required; impacts from the Proposed Action Alternatives  
22 would be negligible to minor.

23 Adherence to existing Installation management plans would guide Proposed Action activities, as  
24 it does for current training and operations.

### **3.13 Hazardous Materials, Hazardous Waste, and Toxic Substances**

#### **3.13.1 Affected Environment**

Hazardous materials used at PCMS include gasoline, diesel fuel, oil, and lubricants used during routine maintenance; pesticides; and explosive and pyrotechnic devices used in military training operations. Any residual hazardous materials including oil, lubricants, solvents, and batteries generated during routine maintenance are recovered for reuse or recycling. Other hazardous materials, such as pesticides and fuel, are consumed in the process of performing operations and/or training. Hazardous materials brought to PCMS by maneuvering units are recovered as material and taken back to their home station for further use, or classification and turn-in for reissue, or proper disposal. In the event that hazardous wastes are generated at PCMS, they will be managed under the rules and regulations as they pertain to a Conditionally Exempt Small Quantity Generator (CESQG) under RCRA.

Explosive and pyrotechnic devices are employed in military training operations at PCMS; however, high explosives are not used. In 2013, munitions used at PCMS consisted of 5.56-mm, 7.62-mm, 9-mm, and .45 and .50 caliber bullets.

A small amount of medical waste could be generated through the treatment of illnesses or injuries during training events. All medical waste generated at PCMS is disposed of through a Medical Department Activity (MEDDAC) contractor permitted to dispose of medical waste. This waste is transported to Evans Army Community Hospital at Fort Carson and is disposed of in accordance with established MEDDAC plans and procedures.

##### **3.13.1.1 Regulatory Background and Definitions**

PCMS is regulated as a CESQG of hazardous waste and as a small quantity handler of universal waste (SQHUW) under RCRA. The USEPA validated these statuses during an inspection on June 26, 2013 (Gallegos, 2013). A CESQG is the lowest level generator of hazardous waste, generating equal to or less than 220 pounds of hazardous waste in a calendar month. CESQGs are exempt from most hazardous waste generator standards in accordance with 6 CCR 1007-3 and do not require a permit. CESQGs do, however, have two primary responsibilities: 1) they must identify all of the hazardous wastes that they generate, and 2) they must ensure that these wastes are ultimately treated or disposed of at a facility that is approved to take it. Small quantity handlers of universal waste collectively generate less than 11,000 pounds of batteries, pesticides, mercury-containing devices, aerosol cans, lamps, and electronic devices and components in a calendar month. SQHUWs must manage material in a way that prevents release to the environment, accumulate waste less than one year, and immediately contain all releases and residues from universal wastes.

AR 200-1, *Environmental Protection and Enhancement* requires Army installations to develop and implement a hazardous waste management plan (HWMP) or other comparable document appropriate to the size and complexity of the operation. The HWMP (or other comparable document) should include, at a minimum, written procedures for all aspects of hazardous waste management, including the identification, storage, and transporting of hazardous waste; training of personnel; tracking manifests; and maintaining required records. This specific requirement is addressed in the Fort Carson HWMP, applicable to PCMS.

##### **3.13.1.2 Environmental Compliance and Management Plans**

Fort Carson incorporates PCMS into its comprehensive program to manage hazardous waste, hazardous materials, and toxic substances. Several plans provide the methodology for management of hazardous materials and waste including, but not limited to:

- Waste Minimization (Pollution Prevention [P2]) Plan. The P2 Plan provides a comprehensive approach to waste and resource management that seeks to reduce impacts on the environment by reducing or eliminating the production of wastes and promoting energy efficiency and sustainable practices (Fort Carson, 2013d).
- Spill Prevention Control and Countermeasures Plan (SPCC Plan). The SPCC Plan provides procedures to follow for spill prevention and response measures should a spill occur. It includes a detailed oil and chemical inventory and contains oil and chemical storage areas on PCMS (Fort Carson, 2007b).
- Hazardous Waste Management Plan (HWMP). The HWMP is designed to ensure compliance with applicable Federal, state, local, permit, and Army regulations. The HWMP assigns responsibility and documents procedures for the identification, characterization, accumulation, storage, transportation, record keeping, and disposal of hazardous waste, universal waste, and certain excluded and non-regulated waste (Fort Carson, 2012c).
- Management Plans for Radon, Radioactive Materials, Asbestos, Lead, Polychlorinated Biphenyl (PCBs), and Installation Pest Management. These plans provide procedures for identification, management, and mitigation of the applicable hazards.
- Fort Carson 25-Year Sustainability Goal Plan. The plan includes goals for sustainable energy and water resources, transportation, air quality, development, procurement, training lands, and zero waste. The Zero Waste goal is to reduce the total weight of solid and hazardous waste disposed of to zero by 2027. Reductions would be attributed to sustainable procurement practices, reduction in material use, and increase in reuse and recycling.
- Evans Army Community Hospital Hazardous Materials/Hazardous Waste Program; MEDDAC Regulation Number 40-5-6 and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5.

### **3.13.1.3 Hazardous Material Use**

#### **3.13.1.3.1 Cantonment Area**

Activities involving the use of hazardous materials, including petroleum-based products, at PCMS involve the operation and maintenance of vehicles. Gas and diesel are stored in 20,000 gallon aboveground storage tanks (ASTs). JP-8 and gasoline are stored in five 20,000 gallon USTs with bulk and retail dispensing mechanisms. Used oil is accumulated in a 1,000 gallon AST within the POL facility. Heating oil is stored in smaller USTs located in the cantonment area. The Army implements the requirements of AR 200-1 to minimize the risk of storage and potential spills into the environment. An SPCC Plan has been developed and is in effect at PCMS.

As required by Army policies, PCMS emphasizes integrated pest management. Pesticides and herbicides could be required for insect and rodent control in structures and control of undesired vegetation, including noxious plants. Potential areas of pesticide application include the grounds surrounding support facilities and ranges. A small inventory of DoD-approved pesticides are maintained and managed on site in accordance with the Installation Pest Management Plan.

Asbestos-containing materials and lead-based paint could be present in buildings constructed before 1978. However, the cantonment area facilities were constructed after 1985 and thus do not contain asbestos or lead-based paint.

### **3.13.1.3.2 Training Areas**

Petroleum-based products are used in the training areas for the routine repair and maintenance of vehicles and replacement of obsolete or malfunctioning target systems, such as electrically powered lifters, that contain minute amounts of lubricating oil. Major repairs are done at Fort Carson. Electric lifters from mobile targets are stored at the small arms live-fire ranges.

### **3.13.1.4 Hazardous Waste Management**

In the event that hazardous wastes are generated at PCMS, they will be managed under the rules and regulations as they pertain to CESQG under RCRA.

### **3.13.1.5 Other Toxic Substances**

Other toxic substances that could potentially be encountered at PCMS outside of the cantonment area include asbestos, lead-based paint, and PCBs. If present, these substances would only be located within structures constructed prior to 1979, such as the existing ranch dwellings located within PCMS. These areas would not be disturbed under the Proposed Action Alternatives.

Asbestos-containing materials were prevalent in building construction until the 1970s. Although the use of asbestos has declined dramatically, asbestos is occasionally found in various building materials. Specifically, asbestos can potentially be found in floor tiles, pipe wrapping, ceilings, and insulation.

Lead-based paint is no longer used but may be found in older structures (pre-1977). Lead can potentially be found in chipped or cracked painted walls or in surrounding soils.

Transformers manufactured prior to 1976, and light ballasts manufactured before 1979, are assumed to contain PCB waste. Transformers associated with power lines have no PCBs at PCMS, according to San Isabel Electric Association. Light ballasts were installed after 1979 at PCMS and do not contain PCBs.

### **3.13.1.6 Existing Sites**

No solid waste management units as defined and regulated under RCRA have been identified at PCMS.

One corrective action plan (CAP) is currently ongoing for the cleanup of a series of leaking underground storage leak events within the cantonment area. The leak events are the result of UST upgrades that were performed in 1993. Fort Carson originally implemented cleanup actions for these events and received a No Further Action on May 4, 2000 from the Colorado Department of Labor and Employment, Division of Labor and Public Safety (OPS); however, a subsequent 2009 site investigation was performed that detected benzene, methyl tertiary-butyl ether (MTBE), naphthalene, and total petroleum hydrocarbons above their Risk-Based Screening Levels. On February 11, 2010, OPS requested preparation of a CAP for the site, which Fort Carson submitted on August 31, 2011. OPS granted approval of the CAP on January 11, 2011. Storage tank removal and restoration is anticipated to be complete 2016-2017.

## **3.13.2 Environmental Consequences**

This section provides a discussion of the environmental impacts to hazardous materials, hazardous waste, and toxic substances that would result from the Proposed Action Alternatives. A significant impact would occur when substantial additional risk to human health or safety would be attributable to Army actions, including direct human exposure, substantial increase in environmental contamination, or violation of applicable Federal, state, DoD, and local regulations. Table 3.13-1 provides a comparison summary of anticipated level of impacts.

**Table 3.13-1. Summary of Hazardous Materials, Hazardous Waste, and Toxic Substances Impacts**

| Alternative                           | Negligible | Minor | Moderate | Significant | Beneficial |
|---------------------------------------|------------|-------|----------|-------------|------------|
| <b>No Action</b>                      |            | X     |          |             |            |
| <b>Proposed Action Alternative 1A</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |
| <b>Proposed Action Alternative 1B</b> |            |       |          |             |            |
| ABCT Training                         |            | X     |          |             |            |
| IBCT Training                         |            | X     |          |             |            |
| SBCT Training                         |            | X     |          |             |            |
| Aviation Gunnery and Flare Training   | X          |       |          |             |            |
| Electronic Jamming Systems            | X          |       |          |             |            |
| Laser Targeting                       | X          |       |          |             |            |
| Demolitions Training                  |            | X     |          |             |            |
| UAS Training                          | X          |       |          |             |            |
| UGV Training                          | X          |       |          |             |            |
| Airspace Reclassification             | X          |       |          |             |            |
| DZ Development                        | X          |       |          |             |            |
| Combined Elements <sup>a</sup>        |            | X     |          |             |            |

a. Overall combined level of direct impact to hazardous materials/waste and toxic substances would be minor. BCT training would be intermittent and short term, but hazardous material releases are always possible during maneuver training and maintenance activities. Demolition training could result in minor short-term impacts due to incomplete conversion of explosives. Approximately 0.003 percent of explosives could remain in adjacent soils after detonation, although most would be expected to dissipate or evaporate into the air.

ABCT=Armor Brigade Combat Team; DZ=drop zone; IBCT=Infantry Brigade Combat Team; SBCT=Stryker Brigade Combat Team; UAS=unmanned aerial system; UGV=unmanned ground vehicle

### 1 3.13.2.1 No Action Alternative – Continue Existing Mission and Training 2 Operations at PCMS

3 Under the No Action Alternative, no additional training activities would be required and existing  
4 site conditions would not be impacted. Hazardous waste generation amounts and types would

remain consistent with current conditions. No impacts to Hazardous and Toxic Substances would be expected under the No Action Alternative. Overall impacts would be minor.

### **3.13.2.2 Proposed Action Alternative 1A – Brigade Maneuver Training and Maneuver Impacts Measurement**

None of the BCT training activities under Alternative 1A are anticipated to exceed the regulatory thresholds of 220 pounds of hazardous waste or 11,000 pounds of universal waste generation per calendar month. PCMS would, therefore, not increase to a Small Quantity Generator of hazardous waste or a Large Quantity Handler of Universal Waste. Furthermore, the establishment of a BCT-level training intensity limit using SMAs and Task Order Miles to complement the 4.7-month brigade-level training period duration would have no adverse impacts on air hazardous materials, hazardous waste, and toxic substances. Potential impacts from BCT training under Alternative 1A are further discussed below.

#### **3.13.2.2.1 ABCT Training**

Minor, short-term adverse impacts would be anticipated as a result of Alternative 1A due to potentially increased Soldier and equipment concentrations during ABCT-level training events. This could result in the additional presence of hazardous materials and the generation of additional wastes per training event. There would, however, be no anticipated change in hazardous waste generator and universal waste handler status as a result of Alternative 1A actions. Fort Carson armor units would continue to generate nominal amounts of non-RCRA regulated wastes such as antifreeze, used oil, and absorbents. They would also potentially generate small amounts of universal waste batteries and aerosol cans during training exercises. No hazardous waste generation is anticipated, although it may occur infrequently in small amounts, such as fuel contaminated with water or antifreeze. All regulated wastes would continue to be properly accumulated and sent to an appropriate recycler or treatment, storage, and disposal facility in accordance with CDPHE regulations and Fort Carson policy.

#### **3.13.2.2.2 IBCT Training**

Minor short-term adverse impacts would be anticipated as a result of Alternative 1A. Most IBCT training events would predominantly consist of dismounted maneuvers. Soldiers typically would be transported to their respective training areas by wheeled vehicles and/or rotary-winged aircraft. Potential releases of hazardous materials are thereby reduced as vehicular traffic exists for transport versus maneuver purposes, resulting in less heavy equipment usage overall. Small amounts of hazardous materials, such as oil and lubricants, would be used for maintaining individual and crew-served weapons. Anticipated wastes from IBCT maneuver and maintenance activities would include primarily weapons-cleaning wipes/rags, absorbents/spill residue, small amounts of oils, antifreeze, and batteries. Volumes of these wastes generated by IBCTs would be considerably less than those of an ABCT due to the types of equipment employed, modes of transport, and methods of training an IBCT. All regulated wastes would continue to be properly accumulated and sent to an appropriate recycler or treatment, storage, and disposal facility in accordance with CDPHE regulations and Fort Carson policy.

#### **3.13.2.2.3 SBCT Training**

Minor short-term adverse impacts would be anticipated as a result of SBCT-level training events under Alternative 1A. SBCT training could result in the additional presence of hazardous materials and the generation of additional wastes per training event. There would, however, be no anticipated change in hazardous waste generator and universal waste handler status. The Stryker units would generate nominal amounts of non-RCRA regulated wastes such as antifreeze, used oil, and absorbents. They would also potentially generate small amounts of universal waste batteries and aerosol cans during training exercises. No hazardous waste



generation is anticipated, although it may occur infrequently in small amounts. All regulated wastes would continue to be properly accumulated and sent to an appropriate recycler or treatment, storage, and disposal facility in accordance with CDPHE regulations and Fort Carson policy.

### **3.13.2.3 Proposed Action Alternative 1B – Enhanced Readiness Training Using New Tactics and Equipment at PCMS**

None of the activities under Alternative 1B are anticipated to exceed the regulatory thresholds of 220 pounds of hazardous waste or 11,000 pounds of universal waste generation per calendar month. PCMS would, therefore, not increase to a Small Quantity Generator of hazardous waste or a Large Quantity Handler of Universal Waste.

#### **3.13.2.3.1 ABCT, IBCT, and SBCT Training**

As analyzed within Proposed Action Alternative 1A, brigade maneuver training and reconfiguration would result in individually minor impacts to hazardous materials, hazardous waste, and toxic substances. Alternative 1B incorporates the BCT training elements of Alternative 1A, and would enable readiness training to be conducted at PCMS using new tactics, equipment and infrastructure improvements. Potential impacts from readiness training using new tactics and equipment are discussed below.

#### **3.13.2.3.2 Aviation Gunnery (non-explosive) and Flare Training**

Negligible impacts are anticipated for this resource area under Proposed Action Alternative 1B. Aviation gunnery would involve the firing of the practice 2.75-inch rocket (WTU-1/B) within two new proposed SDZs in Training Areas 7 and 10. Upon being fired, these rounds do not maintain any residual hazardous substances, which result in an approximate 8-pound, inert steel casing remaining on the training range per firing instance. Due to current Army safety regulations, the recovery of these rounds is not allowed after training events. Therefore, rounds would accumulate after each event and not be removed until a cleanup authorization is requested and approved. Training rounds would be cleaned up in accordance with Training Manual (TM) 60A 1-1-22, *EOD Procedures/General EOD Safety Procedures*, and TM 60A 1-1-31 *EOD Procedures/General Information on EOD Disposal Procedures*. The remaining steel rounds would not be classified as hazardous or universal waste, and would not contribute to the training site being classified a solid waste management unit under RCRA.

Flare training under Alternative 1B involves the employment of flares from aircraft. Flares consist of magnesium pellets that are used to distract heat-seeking missiles. They are designed to burn out before reaching the ground to minimize fire hazard. As such, they would not generate waste requiring classification nor contribute to subsequent site contamination.

#### **3.13.2.3.3 Electronic Jamming Systems**

Negligible impacts would be anticipated for electronic jamming systems training under Proposed Action Alternative 1B. Aircraft- and vehicle-employed electronic jamming systems are powered by the equipment in which they are mounted. This function would not result in hazardous materials use or disposal. Some jamming systems are transported and employed by Soldiers from a man-portable (backpack) configuration. These systems are powered using rechargeable lithium ion batteries, which would not result in substantial volumes of spent battery generation. When batteries become no longer rechargeable, they are returned to the Fort Carson Hazardous Waste Storage Facility (HWSF) for processing as universal waste.

#### **3.13.2.3.4 Laser Targeting**

Negligible impacts would be anticipated due to the use of laser targeting systems under Proposed Action Alternative 1B. Aircraft- and vehicle-employed laser systems are powered by the equipment in which they are mounted. This function would not result in hazardous materials use or disposal. Some laser systems are transported and employed by Soldiers from a man-portable (backpack) configuration. These systems are powered using rechargeable lithium ion batteries, which would not result in substantial volumes of spent battery generation. When batteries are no longer rechargeable, they are returned to the Fort Carson HWSF for processing as universal waste.

#### **3.13.2.3.5 Demolitions Training**

Minor short-term and spatially limited impacts would be expected as a result of demolitions training under Alternative 1B. Units would use only small quantities (less than 25 pounds each) of domestic explosives at PCMS within eight approved areas on Training Areas 7 and 10 (see Figure 2.2-10). Explosives would include ammonium nitrate, trinitrotoluene (TNT), composition C4, and dynamite. Constituents of concern in explosives include nitroaromatics (e.g., TNT) and cyclonitramines, including RDX (Royal Demolition Explosive, cyclotrimethylene trinitramine) and HMX (High Melting Explosive, cyclotetramethylene tetranitramine) that are mixed with plastics or other polymer binders. Pentaerythritol tetranitrate (PETN) is used in blasting caps, detonation cord, and similar initiators of explosions. Under normal use, 99.997 percent of the explosive is consumed (USACE, 2003). Field studies conducted by the U.S. Army indicate that explosives residues include 0.003 percent or less of the original quantity of material detonated, although the amounts of explosive residues can vary (USACE, 2003). The remaining residues could potentially contaminate the soils in the detonation area; however, most of the by-products would dissipate or evaporate in the open air and would not be considered hazardous under those circumstances.

#### **3.13.2.3.6 UAS Training**

Negligible impacts would be anticipated as a result of UAS training under Alternative 1B. Both UASs being considered for training at PCMS, the Raven and Shadow, are powered using rechargeable lithium ion batteries and motor gasoline (MOGAS), respectively. Any spent lithium batteries generated during training would be classified as universal waste and would be returned to Fort Carson to be processed through the HWSF for recycling or disposal. MOGAS related waste could include small amounts of spill debris during refueling operations or potential ruptured fuel tanks. Spills would be anticipated to be less than five gallons in size per instance, to include a potential spill resulting from a Shadow UAS crash. Shadows have an approximate 13.7 gallon fuel capacity and use a two-cycle gasoline/oil mixture. They are the only fueled UAS flown at PCMS. In the event of a Shadow UAS crash, contaminated soil and debris would be cleaned up and disposed of in accordance with established PCMS spill response procedures.

#### **3.13.2.3.7 UGV Training**

Negligible impacts would be anticipated as a result of UGV training under Proposed Action Alternative 1B. The UGVs being considered for training at PCMS are powered using rechargeable lithium ion batteries. Any spent lithium batteries generated during training would be classified as universal waste and would be returned to Fort Carson to be processed through the HWSF for recycling or disposal.

**3.13.2.3.8 Airspace Reclassification**

Reclassification of airspace under Proposed Action Alternative 1B would have no impacts in this resource area. Airspace reclassification is purely an administrative function that would not require hazardous materials usage or waste generation activities.

**3.13.2.3.9 DZ Development**

Establishment of new DZs under Alternative 1B would have no impacts regarding hazardous materials, hazardous waste, or toxic substances management. Neither construction nor maintenance activities that utilize hazardous materials would be required.

**3.13.3 Mitigation Measures**

No mitigation measures would be required. Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations. Inert non-dud-producing 2.75-inch training rounds would be removed in accordance with TM 60A 1-1-22, *EOD Procedures/General EOD Safety Procedures*, and TM 60A 1-1-31 *EOD Procedures/General Information on EOD Disposal Procedures*.

## 4 Cumulative Impacts

The CEQ regulations implementing NEPA defines a “cumulative impact” as follows:

*Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).*

USEPA guidance to reviewers of cumulative impacts analyses further adds:

*...the concept of cumulative impacts takes into account all disturbances since cumulative impacts result in the compounding of the effects of all actions over time. Thus, the cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity (Federal, non-Federal or private) is taking the action (USEPA, 1999).*

For the purposes of this EIS, cumulative impacts result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable actions regardless of who undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. For the purposes of the cumulative impacts analysis, the Proposed Actions ROI is limited to PCMS and adjacent lands (including communities around PCMS), the airspace above PCMS, and surrounding aviation assets. This ROI includes areas where the Proposed Actions effects would most likely contribute to cumulative environmental effects.

The Army considered a wide range of past, present, and reasonably foreseeable future actions by researching existing literature and contacting local area planners and state and Federal agencies to identify other projects in the ROI that could contribute to cumulative environmental effects. The Army considered other past, present, and foreseeable future actions regardless of whether the actions were similar in nature to the Proposed Actions or outside the jurisdiction of the Army.

### 4.1 Impacts Methodology

This cumulative impacts analysis considers direct and indirect impacts determined from the alternatives analysis presented in Chapter 3, and the past, present, and future projects considered relevant to the analysis. For the purposes of the cumulative impacts analysis, the Proposed Actions ROI is defined to include PCMS and adjacent lands (including communities around the Installation). Past and present actions within PCMS are captured in the affected environment section of Chapter 3, unless otherwise noted.

Section 4.2, PCMS Location and Cumulative Impact Setting, lists the past, present, and reasonably foreseeable future Army actions, and other actions within the ROI, that were reviewed in conducting the cumulative effects analysis. The information in this section represents a review of credible online sources, local planning documents, and communication with the local planning agencies having responsibility for, or jurisdiction over, lands or projects within the ROI. Only those projects that were determined to be reasonably foreseeable have been included for consideration in the cumulative impact analysis. "Reasonably foreseeable" is defined as those projects that are well-developed, in mature planning stages, and/or have funding secured. Conceptual projects, broad goals, objectives, or ideas listed in planning

documents that do not meet the above criteria are not considered reasonably foreseeable for the purposes of this analysis.

In addition, the Army funded the preparation of a series of studies to assess the historic impacts of military training at PCMS. The studies evaluated the historic vegetation and soil impacts discussed in AARs from 1985 through 2002, PCMS vegetation cover change from Army use and management, and the repair and mitigation effectiveness of sites disturbed by military training. A summary of conclusions from the draft studies is included in Section 4.2.4, Draft Historic Vegetation and Soil Impact Studies.

## **4.2 PCMS Location and Cumulative Impact Setting**

The area surrounding PCMS is, and has historically been, devoted primarily to agricultural uses, particularly ranches, large grazing operations, and undeveloped lands. US 350, which follows a portion of the historic Santa Fe Trail and runs along the western edge of PCMS, connects the two largest cities near PCMS (La Junta to the northeast and Trinidad to the southwest). The 2010 Census estimated populations of approximately 9,096 individuals in Trinidad and 7,077 individuals in La Junta. The limited development of the area has disturbed natural areas and affected biological resources, cultural resources, soils, and water resources. Cultural and paleontological resources are present throughout the area and at PCMS. Past agricultural practices might have also disturbed these resources. Some of these resources are present on Federal lands, such as the Comanche National Grassland, and are protected from disturbance. Historical grazing may also have affected wildlife, vegetation, soils, and water resources. PCMS was established by the Army in the mid-1980s. The land, which previously supported large grazing operations and several residences, was purchased in 1983, and military training operations began at the site in 1985.

Military training at PCMS has undergone periodic fluctuations since acquisition. Geopolitical and economic factors play a role in determining training levels in response to world events. Ultimately, the differing levels of training have been a result of changes to the composition of units utilizing PCMS, including units stationed at Fort Carson, and their mission.

### **4.2.1 PCMS Current and Ongoing Projects**

The following is a list of current and/or ongoing activities at PCMS:

- Fuel facility repairs
- Fenceline repairs
- Rail repair
- MSRs maintenance/repair
- Buildings maintenance/repair
- Hunting gates maintenance/repair
- Firebreak maintenance
- Forestry operations
- ITAM repairs/maintenance
- Seibert Stakes placement

#### 4.2.2 PCMS Reasonably Foreseeable Future Actions

The following is a list of reasonably foreseeable future activities at PCMS:

- Vehicle Wash Facility
- New Fuel Facility

Other future projects include the addition of a permanent staging area for equipment at PCMS to reduce transportation costs and inefficiency when moving heavy equipment to and from Fort Carson. A permanent staging area would involve the repurposing and construction of new facilities (e.g., clamshells) to store and secure tools and repair parts, perform logistics, and properly store POL products in order to support vehicle maintenance for training units. An equipment storage yard would also be needed to store a training vehicle equipment set at PCMS. Although a Tactical Equipment Training Set at PCMS is considered a foreseeable action, funding is currently not available and not enough information is available to assess impacts. Once sustainment plans (i.e., maintenance, security, etc.) are fully developed, additional NEPA analysis would be conducted, if appropriate.

Currently, there is no reasonably foreseeable new equipment (outside of those discussed in this EIS) that has the potential to train at PCMS. As training needs and tactics evolve, there may be a need for new equipment in the future. Should this need arise, additional NEPA analysis would be conducted, if appropriate.

There is a potential for future reductions of both Fort Carson Soldier and Army civilian populations as part of the Army 2020 Force Structure Realignment. Potential reductions include up to 15,295 permanent Soldiers and 705 Army civilians at Fort Carson. This reduction in force could result in the potential reduction of training at PCMS by Soldiers stationed at Fort Carson. As no force restructure decisions have been made by the Army, this action is not deemed reasonably foreseeable at this present time.

#### 4.2.3 Off-Post Projects

The off-post development projects near PCMS are primarily wind energy development projects and mining within upstream areas of the Purgatoire River watershed. Wind energy projects include an 86-turbine wind farm in the northwest part of the Las Animas County and four wind turbines east of the I-25 corridor.

The Purgatoire River basin contains numerous mining operations, including borrow materials for construction and oil and gas exploration. The mining operations consist primarily of coal mines that utilize the method of methane extraction. Abandoned mine lands have contributed to water quality degradation (acidification) within the Purgatoire River watershed tributaries. Beginning in 2010, a watershed monitoring program consisting of 25 sampling locations was established within the Purgatoire River basin to collect and evaluate surface water data in areas of the watershed influenced by coal bed methane operations in Las Animas County (Segment 5a), west of the City of Trinidad (Purgatoire Watershed, 2014). The most recent annual summary of water quality data, collected in 2012, shows that water quality standards have been met and beneficial uses have been protected in Segment 5a of the Purgatoire River (upstream of PCMS), with the exception of seasonal exceedances during spring runoff and storm events when total recoverable iron (protective of aquatic life per USEPA's recommended ambient water quality criterion for aquatic life that allows for protection of aquatic life in our nation's water) exceedances can occur. Data indicates that the total recoverable iron concentration is strongly correlated to the total suspended solids conveyed by the river. The dominant source of sediment (total suspended solids, TSS) is not coal bed methane discharges, but runoff from other sources, including wildfire burn areas and stream bank erosion (TetraTech, 2014).

#### 4.2.4 Draft Historic Vegetation and Soil Impact Studies

Factors that can affect vegetation over time at PCMS include precipitation, military training, grazing and grazing removal, fire occurrence, and changes in the vegetation community composition. Precipitation has been shown to have a large effect in the PCMS region. Precipitation amounts can vary widely on a local scale, resulting in patchy increases or decreases in vegetation cover within the installation and neighboring areas (VersarGMI, 2014). The draft study indicates that impacts to vegetation and soils at PCMS have occurred due to past large-scale training events; however, changes implemented over the years to the Army's management and rehabilitation of training lands have improved the disturbance response rate and recovery success. The draft study compared existing conditions to conditions dating back to 1984. The following vegetation changes within PCMS are key conclusions of the study (VersarGMI, 2014):

- A wide variety of changes to vegetation over the past few decades have occurred within the region.
- Vegetation change within and external to PCMS appears to be driven primarily by precipitation, increasing in wet years and decreasing in dry years.
- The comparisons over time show relatively persistent vegetation patterns across PCMS. Military training has negatively affected the areas that are utilized frequently.
- The road and trail system developed at PCMS provides a way for vehicles to access remote areas without affecting vegetated areas. Past AAR accounts document vehicles driving parallel to roads to avoid dusty or muddy road conditions. Increased personnel education, awareness, and enforcement, as well as improved road maintenance, have mitigated the need to drive off roads while convoying to training areas. If there were no established road system on the installation, trails would develop throughout natural areas.
- Inter-annual changes in vegetation communities (cover and type) are driven by precipitation, which has a major influence on species composition and cover density. Over the entire study period (1984 to present), there is a general negative trend in cover quality in the heaviest-used areas and a neutral or slightly positive trend in less-used areas.
- The study results indicate that short-term impacts following training events can be extensive, while long-term impacts are less extensive and may be mitigated or avoided through re-seeding and recovery efforts.

The following are key conclusions regarding the effectiveness of Army land rehabilitation and management at PCMS:

- RTLA data shows that disturbed areas that have been rehabilitated over time exhibit similar canopy cover to other grassland areas in the region, but at lower cover densities. The quick establishment of native vegetation from reseeding efforts has reduced invasive species.
- Overall, the results of the assessment show that historic impacts to vegetation and soils at PCMS have occurred throughout PCMS. Changes implemented over the years by the Army have improved the response (vegetation recovery) to these disturbances. The AARs, RTLA reports, and LRAM projects show a track record of improvements to reduce the effects of military exercises.



- Investments in infrastructure improvements to the road and trail system at PCMS have allowed vehicles to access remote areas with minimal impacts. The LRAM projects have reduced trail proliferation, and have aided in reducing long-term soil erosion. Trail improvements have reduced the need for vehicles to go off trail to avoid dusty or muddy conditions, and have focused vehicle crossings of stream channels to designated locations.
- Improvements to stream water quality (reduction of sediment loads) are likely a result of the numerous erosion control dams installed within PCMS training lands.

### 4.3 Cumulative Impacts

Cumulative impacts discussed in this section consider the combined elements of Proposed Alternatives 1A and 1B, referred to as “Proposed Actions”.

#### 4.3.1 Land Use

The Proposed Actions when combined with past, present, and future projects would result in less than significant cumulative impacts. Projects identified in Sections 4.2.1 and 4.2.2 would likely result in long term beneficial impacts to land use at PCMS. Although the Proposed Actions would result in minor to moderate land use impacts, minor cumulative impacts would be expected when considered with ongoing and future activities on-post. The Proposed Actions, when combined with the limited past, ongoing, or future off-post development and land use changes that have been identified surrounding PCMS, are not anticipated to result in land use conflicts when considered with these activities.

#### 4.3.2 Air Quality and Greenhouse Gases

The Proposed Actions would have long-term minor adverse cumulative effects to air quality. The State of Colorado takes into account the effects of all past, present, and reasonably foreseeable emissions during the development of the State Implementation Plan (SIP). The state accounts for all significant stationary, area, and mobile emission sources in the development of this plan. This is done by implementing a regulatory structure designed to prevent air quality deterioration for areas that are in attainment with the NAAQS (USEPA, 2013f). This structure of rules and regulations is contained in the SIP. SIPs are the regulations and other materials that are followed in order to meet clean air standards and associated CAA requirements. The SIPs include:

- State regulations that USEPA has approved
- State-issued, USEPA-approved orders requiring pollution controls
- Planning documents, such as area-specific compilations of emissions estimates and computer modeling demonstrating that the air meets the NAAQS (USEPA, 2013g)

The SIP process includes (either specifically or indirectly) all sources of air emissions associated with the proposed training activities at PCMS as described in Chapter 2, and all activities in the region. No large-scale projects or proposals have been identified that, when combined with the proposed training activities at PCMS would violate any aspect of the current SIP or threaten the attainment status of the region. In addition, no large-scale projects or proposals have been identified that, when combined with the proposed training activities at PCMS, would have substantial GHG emissions, or would lead to a violation of any Federal, state, or local air regulation. This includes all current and reasonably foreseeable activities on PCMS, such as the permanent staging area and equipment storage yard, and uses adjacent to PCMS, such as mining to the east and nearby agricultural activities.

Although there would be a minor increase in emissions associated with the Proposed Actions, brigade training at PCMS may introduce long-term incremental beneficial effects to air quality by potentially displacing training activities to locations outside of areas with poor air quality.

#### **4.3.3 Noise**

Moderate, long-term, cumulative effects would be expected. Changes in ground maneuvers, aviation-based training, and the addition of the proposed demolitions training would incrementally increase the overall noise environment in the long-term. Overall moderate, cumulative effects to the noise environment at PCMS would be anticipated due to the Proposed Action. There are no projects identified in Section 4.2, PCMS Location and Cumulative Impact Setting, that when combined with the Proposed Actions would have significant adverse effects.

#### **4.3.4 Geology and Soils**

As stated in Section 4.2.4, Draft Historic Vegetation and Soil Impact Studies, the effects of military training on PCMS ground cover have been mixed and cumulative over time. The loss of shallow grassland soils can remove nutrients and water holding capacity resulting in long-term reductions of ecosystem vigor and resilience. The effects of military training can cause an increase in exposed soils, especially during drought periods, but vegetation appears to gradually recover over time. Heavily-used areas require the greatest level of intervention to promote recovery (VersarGMI, 2014). It can be assumed that accelerated soil, wind, and water erosion occurred during the periods of little or no vegetative cover after military training; however, erosion within these areas lessens as vegetation recovers. LRAM projects have reduced soil impact by vehicles at PCMS, and past infrastructure improvements have reduced trail proliferation and disturbances to soils along trails and at stream crossings (VersarGMI, 2014). Overall cumulative impacts to past military training on soils have remained less than significant as areas have been demonstrated to largely recover over time from Army use of PCMS.

Although BCT training at PCMS has the potential to cause significant impacts to soils, the reasonably foreseeable on- and off-post projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects), would not cumulatively add to significant adverse effects to soils. On-post projects identified are primarily maintenance and repair projects with a few additional facilities. Limited off-post development projects were identified; therefore, it is assumed that land uses and management of lands surrounding PCMS (primarily ranching) would continue. Mitigation measures identified in Section 3.5, Geology and Soils, would aid in the reduction of long-term cumulative effects to soils on PCMS from military training. Overall cumulative adverse effects to soils would be less than significant.

#### **4.3.5 Water Resources**

LRAM projects have reduced sediment loads in PCMS surface waters; past infrastructure improvements have reduced trail proliferation and have focused vehicle crossings of streams at designated locations (VersarGMI, 2014). Although ABCT and SBCT training at PCMS has the potential to significantly impact water resources, the reasonably foreseeable on- and off-post projects identified in Sections 4.2.1 (PCMS Current and Ongoing Projects) and 4.2.2 (PCMS Reasonably Foreseeable Future Actions) would not contribute to significant adverse effects. Identified on-post projects are primarily maintenance and repair projects, which would have minimal earth-disturbing activities that could impact water resources. Although the construction of additional facilities could lead to additional impervious surfaces that could channel surface water, the Proposed Action alternatives do not involve construction, and thus no additional impervious surfaces will be created.

Cumulative impacts could occur due to current private mining operations in the region. Mining activities can degrade water quality due to chemicals leaching to waterbodies. Mining activities can cause acid mine drainage, which occurs when water from mining or mine-related operations is discharged and contains high levels of dissolved metals and sulfates along with acidic pH values. Elevated acidity in some tributaries of the Purgatoire River Watershed is also attributed to abandoned mine land drainage (Purgatoire Watershed, 2014). As stated in Section 4.2.3 (Off-Post Projects), the mining activities within the Purgatoire River Watershed have not contributed to increased sediment discharges; rather, the increased sediments are likely a result of runoff from other sources, including wildfire burn areas and stream bank erosion. Limited off-post development projects were identified; therefore, it is assumed that land uses and management of lands surrounding PCMS (primarily ranching) would continue. Mitigation measures identified in Section 3.6, Water Resources, would aid in the reduction of long-term cumulative effects to surface waters on PCMS and within the Purgatoire River Watershed from military training. Overall cumulative adverse effects to water resources would be less than significant.

#### **4.3.6 Biological Resources**

Although the increase in intensity of ABCT and SBCT training at PCMS has the potential to significantly impact vegetation, the reasonably foreseeable on- and off-post projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects), would not cumulatively add to significant adverse effects. On-post projects identified are primarily maintenance and repair projects. Limited off-post development projects were identified; therefore, it is assumed that land uses and management of lands surrounding PCMS (primarily ranching) would continue. Mitigation measures identified in Section 3.7, Biological Resources, would aid in the reduction of long-term cumulative effects to vegetation on PCMS from military training. Overall, cumulative adverse effects to biological resources from on- and off-post projects and military training from the Proposed Actions would be less than significant.

#### **4.3.7 Cultural Resources**

Although the proposed use of demolitions at PCMS has the potential to adversely affect cultural resources, the reasonably foreseeable on- and off-post projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects), would not cumulatively add to these significant adverse effects. Mitigation measures identified in Section 3.8, Cultural Resources, would aid in the reduction of long-term cumulative effects to cultural resources on PCMS from military training. Overall cumulative adverse effects to cultural resources would be less than significant.

#### **4.3.8 Socioeconomics**

Current and ongoing actions at PCMS, as well as off-post projects, could have negligible beneficial socioeconomic impacts when considered with the maintenance of PCMS training lands, in the event maintenance or current/ongoing activities utilize local contracted labor. No other cumulative impacts are anticipated when considered with the Proposed Actions and those projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects).

#### **4.3.9 Traffic and Transportation**

The Proposed Actions could occur concurrently with other proposed projects throughout the area; however, there would be no appreciable change in on-post, off-post, or gate traffic from these proposed activities. There are no projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects) that when carried out with the Proposed Actions would contribute to

significant adverse cumulative effects to traffic and transportation. This includes all current and reasonably foreseeable activities on PCMS, such as the permanent staging area and equipment storage yard, and uses adjacent to PCMS, such as nearby mining and agricultural activities. Therefore, the overall cumulative effects on transportation resources would be minor.

#### **4.3.10 Airspace**

There are no known changes planned for any airports within the ROI that would have any impact on on-going or proposed changes to PCMS activities. The existing Piñon Canyon MOA would remain an independent SUA functioning as it has since its establishment. There are no cumulative impacts to airspace from the Proposed Actions when combined with the projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects).

#### **4.3.11 Facilities and Utilities**

Cumulative impacts associated with utilities would consist of the combined effects of the Proposed Actions and other actions and activities that would use additional potable water and energy, generate additional wastewater and solid waste, and disrupt communications and/or adversely impact stormwater conditions. There are no projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects) that when carried out with the Proposed Actions would contribute to significant adverse cumulative effects to facilities and utilities. Minor increases in potable water use, wastewater, and stormwater would occur from the construction of future facilities such as the proposed vehicle wash facility; however, PCMS has the capacity to handle increases in potable water and energy use, and solid waste and wastewater generation that could cumulatively occur. Fort Carson would continue to implement installation SOPs and plans for utilities management at PCMS. Minor cumulative impacts are predicted.

#### **4.3.12 Hazardous Materials, Waste, and Toxic Substances**

Cumulative impacts associated with hazardous materials, toxic substances, and hazardous wastes would consist of the combined effects of the Proposed Actions and other actions and activities that would use additional quantities of hazardous materials/toxic substances, generate additional hazardous wastes, or otherwise result in site contamination. There are no projects identified in Section 4.2.1 (PCMS Current and Ongoing Projects), Section 4.2.2 (PCMS Reasonably Foreseeable Future Actions) and Section 4.2.3 (Off-Post Projects) that when carried out with the Proposed Actions would contribute to significant adverse cumulative effects to hazardous materials, waste, and toxic substances. Overall, PCMS has the capacity to handle minor hazardous material and waste increases and would continue to implement installation SOPs and plans for their reduction, disposal, and handling. Only minor cumulative impacts are predicted.

## 5 Summary of Environmental Consequences and Proposed Mitigation

### 5.1 Environmental Effects Summary

Both the No Action Alternative and the Proposed Action alternatives would result in some degree of adverse effect on most environmental resources. Table 5-1 presents a summary of the environmental consequences of the alternatives analyzed in this EIS. Overall, negligible to minor adverse impacts would be anticipated for the following resource areas: Air Quality and Greenhouse Gases, Socioeconomics, Traffic and Transportation, Cultural Resources, Facilities and Utilities, and Hazardous Materials, Waste, and Toxic Substances. The remaining resource areas have the potential for moderate to significant impacts:

- Land Use – Moderate adverse land use impacts within PCMS with respect to training availability could occur during periods of land rotation as areas are rotated out of mechanized training during land rehabilitation.
- Geology and Soils – Significant adverse impacts to soils could occur from increased BCT training within PCMS. Heavy tracked and wheeled vehicles associated with ABCT and SBCT training could potentially cause high levels of soil disturbance. Maneuvering with tracked and wheeled vehicles in fragile soils during unfavorable soil moisture conditions, as well as increasing Soldier and equipment densities during BCT training events, could potentially cause excessive soil loss that permanently impairs plant growth. Mitigation measures (see Table 5-2) would reduce impacts; however, impacts may not be reduced to less than significant depending on training activities and the condition of the soil. In some instances, mitigation measures could require years of effort and could be dependent on available funding to be fully and successfully implemented.
- Noise – Aviation gunnery training would cause minor adverse impacts to the noise environment at PCMS. Demolitions training would create a distinct and appreciable change to the overall noise environment at PCMS. Moderate long-term adverse impacts to the noise environment at PCMS would occur. The proposed aviation gunnery and demolitions activities would have minor effects to off-post areas.
- Water Resources – The overall combined level of impact to water resources could be potentially significant. Although the various training activities would be intermittent and short term in duration, increased training intensity and use of PCMS for ABCT and SBCT training could increase sedimentation and levels of selenium within nearby impaired waterbodies.
- Biological Resources – The overall combined level of impact to biological resources could be potentially significant. Specifically, long-term increases in ABCT and SBCT training at PCMS could result in significant impacts associated with large maneuver footprints, which could potentially result in a conversion or net loss of habitat at the landscape scale, depending upon frequency of use and recovery time. Mitigation measures (see Table 5-2) would reduce impacts; however, impacts to vegetation and habitat may not be reduced to less than significant depending on the condition of the soil, training activities, and corresponding level of disturbance to vegetation and habitat. In some instances, mitigation measures could require years of effort and could be dependent on available funding to be fully and successfully implemented. Additionally, other proposed training (aviation gunnery and flare training, laser targeting, and demolitions training) could have moderate impacts associated with land and vegetation disturbance and impacts to wildlife species.
- Airspace – The use of electronic jamming systems could present a moderate adverse impact to training operations the use radio frequency devices.

Proposed mitigation has been identified (see Section 5.2, Proposed Mitigation Summary) for those resource areas that could have potentially adverse environmental impacts.

**Table 5-1. Summary of Adverse Environmental Effects**

|                                  | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|----------------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                                  |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Land Use                         |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                       |                       |                                |               |               |                                             | X                                | X               |                         | X                                      | X                                      |                              | X                        |                   |            |
| Minor                            | X                     |                                | X             | X             | X                                           |                                  |                 | X                       |                                        |                                        | X                            |                          |                   | X          |
| Moderate                         |                       | X                              |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |
| Significant                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Air Quality and Greenhouse Gases |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                       |                       |                                |               |               | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        |                   |            |
| Minor                            | X                     | X                              | X             | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 | X          |
| Moderate                         |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Noise                            |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                       | X                     | X                              | X             | X             |                                             | X                                | X               |                         | X                                      | X                                      | X                            | X                        |                   |            |
| Minor                            |                       |                                |               |               | X                                           |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Moderate                         |                       |                                |               |               |                                             |                                  |                 | X                       |                                        |                                        |                              |                          | X                 | X          |
| Significant                      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |

**Table 5-1. Summary of Adverse Environmental Effects**

|                             | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|-----------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                             |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Beneficial                  |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Geology and Soils</b>    |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                  |                       |                                |               |               |                                             | X                                | X               |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                       |                       |                                |               |               | X                                           |                                  |                 |                         |                                        |                                        |                              | X                        |                   |            |
| Moderate                    |                       |                                | X             |               |                                             |                                  |                 | X                       |                                        |                                        |                              |                          |                   | X          |
| Significant                 | X                     | X                              |               | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |
| Beneficial                  |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Water Resources</b>      |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                  |                       |                                |               |               |                                             | X                                | X               |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                       | X                     |                                | X             |               | X                                           |                                  |                 | X                       |                                        |                                        |                              | X                        |                   |            |
| Moderate                    |                       | X                              |               | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   | X          |
| Significant                 |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |
| Beneficial                  |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Biological Resources</b> |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                  |                       |                                |               |               |                                             |                                  |                 |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                       |                       |                                | X             |               | X                                           | X                                |                 |                         |                                        |                                        |                              | X                        |                   |            |
| Moderate                    | X                     | X                              |               | X             |                                             |                                  | X               | X                       |                                        |                                        |                              |                          |                   | X          |



Table 5-1. Summary of Adverse Environmental Effects

|                                   | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|-----------------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                                   |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Significant                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 |            |
| Beneficial                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Cultural Resources</b>         |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                        |                       |                                | X             |               |                                             | X                                | X               |                         | X                                      | X                                      | X                            |                          |                   |            |
| Minor                             | X                     | X                              |               | X             | X                                           |                                  |                 | X                       |                                        |                                        |                              | X                        | X                 | X          |
| Moderate                          |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Socioeconomics</b>             |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                        | X                     | X                              | X             | X             | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        | X                 | X          |
| Minor                             |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Moderate                          |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Traffic and Transportation</b> |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                        |                       |                                |               |               | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        |                   |            |
| Minor                             | X                     | X                              | X             | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 | X          |

Table 5-1. Summary of Adverse Environmental Effects

|                                                                   | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|-------------------------------------------------------------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|                                                                   |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunnery and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Moderate                                                          |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                                                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                                                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Airspace</b>                                                   |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                                                        |                       | X                              | X             | X             |                                             |                                  |                 | X                       | X                                      | X                                      |                              | X                        | X <sup>1</sup>    |            |
| Minor                                                             | X                     |                                |               |               | X                                           |                                  | X               |                         |                                        |                                        | X                            |                          | X <sup>2</sup>    | X          |
| Moderate                                                          |                       |                                |               |               |                                             | X                                |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                                                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                                                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Facilities and Utilities</b>                                   |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                                                        |                       |                                |               |               | X                                           | X                                | X               | X                       | X                                      | X                                      | X                            | X                        |                   |            |
| Minor                                                             | X                     | X                              | X             | X             |                                             |                                  |                 |                         |                                        |                                        |                              |                          | X                 | X          |
| Moderate                                                          |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant                                                       |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial                                                        |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| <b>Hazardous Materials, Hazardous Waste, and Toxic Substances</b> |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Negligible                                                        |                       |                                |               |               | X                                           | X                                | X               |                         | X                                      | X                                      | X                            | X                        |                   |            |

**Table 5-1. Summary of Adverse Environmental Effects**

|             | No Action Alternative | Proposed Action Alternative 1A |               |               | Proposed Action Alternative 1B <sup>a</sup> |                                  |                 |                         |                                        |                                        |                              |                          | Combined Elements | Cumulative |
|-------------|-----------------------|--------------------------------|---------------|---------------|---------------------------------------------|----------------------------------|-----------------|-------------------------|----------------------------------------|----------------------------------------|------------------------------|--------------------------|-------------------|------------|
|             |                       | ABCT Training                  | IBCT Training | SBCT Training | Aviation<br>Gunners and<br>Flare Training   | Electronic<br>Jamming<br>Systems | Laser Targeting | Demolitions<br>Training | Unmanned<br>Aerial Systems<br>Training | Unmanned<br>Ground Vehicle<br>Training | Airspace<br>Reclassification | Drop Zone<br>Development |                   |            |
| Minor       | X                     | X                              | X             | X             |                                             |                                  |                 | X                       |                                        |                                        |                              |                          | X                 | X          |
| Moderate    |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Significant |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |
| Beneficial  |                       |                                |               |               |                                             |                                  |                 |                         |                                        |                                        |                              |                          |                   |            |

a. Proposed Action Alternative 1B also includes the BCT training under Alternative 1A (see Sections 2.2.2 and 2.2.3).

Note: For cases where the impacts from the combined elements are different for Proposed Action Alternative 1A and Proposed Action Alternative 1B, the following convention is used to specify the difference: X<sup>1</sup> = Alternative 1A impacts; X<sup>2</sup> = Alternative 1B impacts.

## **5.2 Proposed Mitigation Summary**

The proposed mitigation was developed based on the analysis of potential resource impacts. Each mitigation is proposed for implementation based on its ability to be enacted, affordability, and likelihood of effectiveness. Final decisions regarding adoption and implementation of proposed mitigation will be made in the Army ROD.

Most potential adverse impacts identified in this EIS would be either negligible or could be avoided through adherence to existing Fort Carson management practices and compliance with existing regulations, permits, and plans. Unavoidable adverse impacts, however, could potentially result from implementation of the Proposed Actions. Table 5-2 identifies potential mitigation measures to reduce impacts to resources discussed in this EIS.

**Table 5-2. Additional Mitigation and Best Management Practices**

| <b>Training Activity</b>                | <b>Existing Operational Controls</b>                                                                                                                                                                                                                                                                                            | <b>Proposed Additional Mitigation Measures and BMPs</b>                                                                                                                                                                                                                              |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Land Use</b>                         |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                      |
| All                                     | <ul style="list-style-type: none"> <li>Mitigation through enhanced application of existing land management programs, including training land rotations, and LRAM land rehabilitation efforts, would be necessary to offset training impacts and maintain quality training lands for sustained military use.</li> </ul>          | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                    |
| <b>Air Quality and Greenhouse Gases</b> |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                      |
| All                                     | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future. Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                    |
| <b>Noise</b>                            |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                      |
| All                                     | <ul style="list-style-type: none"> <li>Compliance with applicable Federal, state, and local noise control regulations to avoid noise that exceeds acceptable sound levels.</li> </ul>                                                                                                                                           | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                    |
| <b>Geology and Soils</b>                |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                      |
| ABCT and SBCT Training                  | <ul style="list-style-type: none"> <li>Enhanced application of existing land management programs, training land rotations, and continued land rehabilitation efforts would be necessary to mitigate (restore) training impacts to soils and maintain quality training lands for sustained military use.</li> </ul>              | <ul style="list-style-type: none"> <li>As necessary, training activities could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain or snow event), following existing color code protocols to minimize soil impacts from vehicles.</li> </ul> |
| All                                     | <ul style="list-style-type: none"> <li>Training activities requiring the use of vehicles would continue to maximize use of existing trail networks to the greatest extent practicable to prevent damage to soils</li> </ul>                                                                                                     | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                    |

**Table 5-2. Additional Mitigation and Best Management Practices**

| Training Activity           | Existing Operational Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             | and trail proliferation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Water Resources</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| ABCT and SBCT Training      | <ul style="list-style-type: none"> <li>Enhanced application of existing land management programs, training land rotations, and continued land rehabilitation efforts would be necessary to offset training impacts and reduce the potential for sedimentation into surface waters, protecting water quality.</li> </ul>                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Training activities could be restricted or reduced by the Commander when the soils are saturated (e.g., after a rain or snow event) following existing color code protocols to minimize soil rutting, erosion, and indirect effects of sedimentation into adjacent surface waters.</li> <li>Additional measures could include the establishment of stormwater devices in strategic locations or bank stabilization projects to control sedimentation.</li> </ul> |
| All                         | <ul style="list-style-type: none"> <li>Training would continue to be done in compliance with Federal and state regulations, Army and Fort Carson regulations, command policy, standing operating procedures, and multiple conservation programs and plans.</li> <li>Training activities requiring the use of vehicles would continue to maximize use of existing trail networks, including designated stream channel crossings, to the greatest extent practicable to reduce potential sedimentation.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Biological Resources</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| ABCT and SBCT Training      | <ul style="list-style-type: none"> <li>Enhanced application of existing land management programs, training land rotations, and continued land rehabilitation efforts would be necessary to offset training impacts and maintain quality training lands for sustained military use.</li> </ul>                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>As necessary, training activities could be restricted or reduced by the Commander when the soils are saturated (e.g. after a rain or snow event) following existing color code protocols to minimize the impacts from rutting and vegetation loss.</li> </ul>                                                                                                                                                                                                    |

**Table 5-2. Additional Mitigation and Best Management Practices**

| Training Activity      | Existing Operational Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Proposed Additional Mitigation Measures and BMPs                  |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Survivability Training | <ul style="list-style-type: none"> <li>During flare training, flares would only be deployed from altitudes of no less than 1,500 feet AGL to ensure that the flares extinguish prior to reaching the ground surface and avoiding the potential for wildland fire.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>None identified</li> </ul> |
| Demolitions            | <ul style="list-style-type: none"> <li>Blasting and other activities that produce extremely loud noises would be avoided within 0.5 miles (800 meters) of active golden eagle nests unless greater tolerance to the activity has been demonstrated by the golden eagles in the nesting area.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>None identified</li> </ul> |
| All                    | <ul style="list-style-type: none"> <li>Training activities requiring the use of vehicles would continue to maximize use of existing trail networks to the greatest extent practicable to reduce impacts to vegetation and trail proliferation.</li> <li>Areas identified for land rehabilitation following training would be reseeded using an approved, site-specific native seed mix to reduce the potential establishment of invasive plant species.</li> <li>The Army would continue to limit potential adverse impacts to sensitive, slow-moving species (i.e., lizards, etc.) by avoiding potential habitats to the extent practicable: only utilizing approved, established routes, and being observant while conducting maneuvers.</li> <li>In accordance with the Bald and Golden Eagle Protection Act, the Army would continue to maintain buffers with a radius measuring 800-meters from surface up to 3,000 feet above ground level around any identified golden eagle nest until the young have fledged. These buffers would exclude all aircraft operations and foot traffic.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul> |

**Table 5-2. Additional Mitigation and Best Management Practices**

| Training Activity                 | Existing Operational Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | <ul style="list-style-type: none"> <li>Off-road vehicle use within 800 meters of a golden eagle nest during the nesting season would continue to be avoided.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                 |
| <b>Cultural Resources</b>         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                 |
| All                               | <ul style="list-style-type: none"> <li>In accordance with the PCMS PA, all eligible sites and sites with unknown eligibility would be avoided during set up for proposed training activities and during the training activities themselves. Sites would be monitored to make sure they remain intact, undisturbed, and not damaged during training exercises.</li> <li>Native American sacred sites and properties of traditional and religious cultural importance would be managed and protected in accordance with the PCMS PA.</li> <li>Native American sacred sites and properties of traditional and religious cultural importance on PCMS would also be avoided during set up for training activities and during the training activities themselves.</li> </ul> | <ul style="list-style-type: none"> <li>Those Proposed Action alternatives which require Section 106 consultation include aviation gunnery and flare training, and demolition training. The other Proposed Action alternatives are addressed in the PCMS Training PA.</li> </ul> |
| <b>Socioeconomics</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                 |
| All                               | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                               |
| <b>Traffic and Transportation</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                 |
| All                               | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future. Adherence to Installation management plans would guide Proposed Action</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                               |



**Table 5-2. Additional Mitigation and Best Management Practices**

| Training Activity          | Existing Operational Controls                                                                                                                                                                | Proposed Additional Mitigation Measures and BMPs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | activities, as it does for current training and operations.                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Airspace</b>            |                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| All                        | <ul style="list-style-type: none"> <li>Compliance with existing regulations, permits, and plans would be required for activities associated with training proposed in the future.</li> </ul> | <ul style="list-style-type: none"> <li>Establishment of Raven Operational Zones (ROZs) at select areas throughout the range would allow for unencumbered operation and training on these airframes without fear of mid-air conflict or interruption due to incoming traffic. Since Ravens are not fitted with location devices, it is up to ground crews and aircraft operators to visually detect and avoid one another. Established ROZs would eliminate this need and allow for multiple consecutive activities.</li> <li>Establishment of flight paths around and through the range would help organize and control VFR traffic, thereby reducing the burden of separation on BAAF ATC. Single direction routes also help reduce the possibility of mid-air conflict, making all training activities safer.</li> </ul> |
| Electronic Jamming Systems | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                            | <ul style="list-style-type: none"> <li>EW training zones should be established based specifically on the effective range of each device utilized or the worst case scenario device to be used. This should be located a safe distance away from the RA boundary to protect non-participating aircraft and it should be identified on range maps as a permanent no fly-zone unless EW operations are sporadic. In those cases, a no-fly-zone can be established and published via NOTAM prior to activation.</li> </ul>                                                                                                                                                                                                                                                                                                     |
| Laser Training             | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                            | <ul style="list-style-type: none"> <li>To reduce the risk of laser usage to non-participating aircraft beyond established protocol, laser fire would be directed away from known airport approach patterns, particularly busy or nearby airports, including Pueblo Memorial Airport (PUB) and the Perry Stokes Airport (TAD).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Table 5-2. Additional Mitigation and Best Management Practices**

| <b>Training Activity</b>              | <b>Existing Operational Controls</b>                                                                                                                                                          | <b>Proposed Additional Mitigation Measures and BMPs</b>                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Demolitions                           | <ul style="list-style-type: none"> <li>None Identified</li> </ul>                                                                                                                             | <ul style="list-style-type: none"> <li>A ceiling would be established for defined demolition areas whereby limited blast effects have a negligible effect to aircraft allowing for a reduction in the loss of navigable airspace within the RA during demo activities, as opposed to establishing a temporary flight restriction (no-fly-zone) over the area from surface up to the proposed RA ceiling of 10,000 feet above MSL.</li> </ul> |
| Cumulative                            | <ul style="list-style-type: none"> <li>Range Operations would provide oversight and scheduling to deconflict what could be a very congested airspace.</li> </ul>                              | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Facilities and Utilities</b>       |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| All                                   | <ul style="list-style-type: none"> <li>Adherence to existing Installation management plans would guide Proposed Action activities, as it does for current training and operations.</li> </ul> | <ul style="list-style-type: none"> <li>None identified</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hazardous and Toxic Substances</b> |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| All                                   | <ul style="list-style-type: none"> <li>Adherence to Installation management plans would guide Proposed Action activities, as it does for current training and operations.</li> </ul>          | <ul style="list-style-type: none"> <li>Inert non-dud-producing 2.75-inch training rounds would be removed in accordance with TM 60A 1-1-22, EOD Procedures/General EOD Safety Procedures, and TM 60A 1-1-31 EOD Procedures/General Information on EOD Disposal Procedures.</li> </ul>                                                                                                                                                        |

AGL=above ground level; ATC=air traffic control; BAAF=Butts Army Airfield; DZ=drop zone; EOD=explosive ordnance disposal; EW=electronic warfare; FC Reg=Fort Carson Regulation; LRAM=Land Rehabilitation and Maintenance; MSL=mean sea level; NEPA=National Environmental Policy Act; PA=Programmatic Agreement; PCMS=Piñon Canyon Maneuver Site; PUB=Pueblo Memorial Airport; RA=restricted area (air space); ROZ=Raven Operational Zone; SAR=Species at Risk; TAD=Perry Stokes Airfield; TM=Training Manual; UAS=unmanned aerial system; VFR=visual flight rules

1

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## 1 6 Acronyms

| <b>Acronym</b> | <b>Definition</b>                                                  |
|----------------|--------------------------------------------------------------------|
| °C             | degrees Celsius                                                    |
| °F             | degrees Fahrenheit                                                 |
| 06CO           | Jecan Airport                                                      |
| 09CO           | Cottonwood Field Airport                                           |
| 0CD5           | Piñon Canyon Airport                                               |
| 1CO5           | Melon Field Airport                                                |
| 4ID            | 4 <sup>th</sup> Infantry Division                                  |
| 8CO6           | Arkansas Valley Regional Medical Center Heliport                   |
| AAA            | anti-aircraft artillery                                            |
| AADT           | average annual daily traffic                                       |
| AAR            | After Action Report                                                |
| AASHTO         | American Association of State Highway and Transportation Officials |
| ABCT           | Armor Brigade Combat Team                                          |
| ACS            | American Community Survey                                          |
| ADCS           | Approach-Departure Control Surface                                 |
| ADNL           | A-weighted day-night average sound levels                          |
| AGL            | above ground level                                                 |
| AMA            | Rick Husband Amarillo International Airport                        |
| ANGB           | Air National Guard Base                                            |
| APE            | Area of Potential Effect                                           |
| AQCR           | Air Quality Control Region                                         |
| AR             | Army Regulation                                                    |
| ARTCC          | Air Route Traffic Control Center                                   |
| ASA IE         | Assistant Secretary of the Army for Installations and Environment  |
| AST            | aboveground storage tank                                           |
| ATC            | Air Traffic Control                                                |
| BAAF           | Butts Army Airfield                                                |
| BCT            | Brigade Combat Team                                                |
| BDA            | battle damage assessment                                           |
| BLM            | Bureau of Land Management                                          |
| BMP            | best management practice                                           |
| BNOISE2        | Blast Noise Impact Assessment software modelling                   |
| CA             | Comprehensive Agreement                                            |
| CAA            | Clean Air Act                                                      |
| CAAQS          | Colorado Ambient Air Quality Standard                              |
| CaD            | Razor silty clay, 4 to 12 percent                                  |
| CALS           | Combat Assault Landing Strip                                       |

| <b>Acronym</b>  | <b>Definition</b>                                         |
|-----------------|-----------------------------------------------------------|
| CAP             | corrective action plan                                    |
| CAS             | close air support                                         |
| CCR             | Code of Colorado Regulations                              |
| CDNL            | C-weighted day-night average sound levels                 |
| CDOT            | Colorado Department of Transportation                     |
| CDPHE           | Colorado Department of Public Health and Environment      |
| CDS             | Container Delivery Systems                                |
| CDWR            | Colorado State Division of Water Resources                |
| CEQ             | Council on Environmental Quality                          |
| CESQG           | Conditionally Exempt Small Quantity Generator             |
| CFA             | Controlled Fire Area                                      |
| CFR             | Code of Federal Regulations                               |
| cfs             | cubic feet per second                                     |
| CGP             | Construction General Permit                               |
| CIG             | Colorado Interstate Gas                                   |
| CO              | carbon monoxide                                           |
| CO <sub>2</sub> | carbon dioxide                                            |
| CO80            | Fowler Airport                                            |
| COA             | Certificate of Authorization                              |
| COF             | Company Operations Facility                               |
| COS             | Colorado Springs                                          |
| CPW             | Colorado Parks & Wildlife                                 |
| CRL             | Container Ramp Load                                       |
| CRRC            | Combat Rubber/Rigid Raiding Craft                         |
| CRS             | Container Release Systems                                 |
| CS              | Combat Support                                            |
| CSS             | Combat Service Support                                    |
| CWA             | Clean Water Act                                           |
| DA              | Department of Army                                        |
| DAR             | Department of the Army Representative                     |
| dB              | decibel                                                   |
| dBA             | A-weighted decibels                                       |
| dBp             | peak decibel                                              |
| DNL             | Day-night Sound Level                                     |
| DoD             | Department of Defense                                     |
| DPTMS           | Directorate of Plans, Training, Mobilization and Security |
| DPW-E           | Directorate of Public Works – Environmental               |
| DZ              | drop zone                                                 |
| EIS             | Environmental Impact Statement                            |

| <b>Acronym</b> | <b>Definition</b>                                                     |
|----------------|-----------------------------------------------------------------------|
| EMS            | Environmental Management System                                       |
| EO             | Executive Order                                                       |
| EPACT          | Energy Policy Act of 2005                                             |
| EPO            | Environmental Protection Officer                                      |
| ES             | erosional status                                                      |
| ESA            | Endangered Species Act                                                |
| EW             | electronic warfare                                                    |
| FAA            | Federal Aviation Administration                                       |
| FAARP          | Forward Area Arming and Refueling Point                               |
| FC Reg         | Fort Carson Regulation                                                |
| FL             | Flight Level                                                          |
| FLS            | flight landing strip                                                  |
| FNSI           | Finding of No Significant Impact                                      |
| FY             | fiscal year                                                           |
| GgB            | Glenberg fine sandy loam, 0 to 3 percent slopes, occasionally flooded |
| GHG            | greenhouse gas                                                        |
| GIS            | geographic information system                                         |
| HE             | Heavy Equipment                                                       |
| HMMWV          | High Mobility Multipurpose Wheeled Vehicle                            |
| HMX            | High Melting Explosive                                                |
| HQ             | Headquarters                                                          |
| HSLADS         | High Speed Low Level Aerial Delivery Systems                          |
| HVCDS          | High Velocity Container Delivery Systems                              |
| HWMP           | Hazardous Waste Management Plan                                       |
| HWSF           | Hazardous Waste Storage Facility                                      |
| I              | Interstate                                                            |
| IBCT           | Infantry Brigade Combat Team                                          |
| ICRMP          | Integrated Cultural Resources Management Plan                         |
| IED            | improvised explosive device                                           |
| IF             | isolated find                                                         |
| IFR            | Instrument Flight Rules                                               |
| ILS            | Instrument Landing System                                             |
| IMC            | Instrument Meteorological Conditions                                  |
| in/sec         | inches per second                                                     |
| INRMP          | Integrated Natural Resources Management Plan                          |
| IONMP          | Installation Operational Noise Management Plan                        |
| IPR            | In-progress review                                                    |
| IR             | Instrument Route                                                      |
| ISA            | International Standard Atmosphere                                     |

| <b>Acronym</b> | <b>Definition</b>                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------|
| ISR            | intelligence, surveillance, and reconnaissance                                                            |
| ITAM           | Integrated Training Area Management                                                                       |
| IWFMP          | Integrated Wildland Fire Management Plan                                                                  |
| JO             | Joint Order                                                                                               |
| JTF            | joint task force                                                                                          |
| K2D            | Kimera-Chicosa complex, 4 to 12 percent slopes                                                            |
| KmC            | Wilid-Kimera complex, 2 to 9 percent slopes                                                               |
| KO             | Kimera-Oterodry fine sandy loams, 2 to 7 percent slopes                                                   |
| kV             | kilovolt                                                                                                  |
| kVA            | kilovolt ampere                                                                                           |
| L/R            | Launch/Recovery                                                                                           |
| LCTA           | Land Condition Trend Analysis                                                                             |
| LCC            | Land Component Commander                                                                                  |
| $L_{eq}$       | Equivalent Sound Level                                                                                    |
| LHX            | La Junta Municipal Airport                                                                                |
| $L_{max}$      | maximum sound level in dB                                                                                 |
| LoA            | Limon silty clay loam, 0 to 1 percent slopes                                                              |
| LOS            | level of service                                                                                          |
| LRAM           | Land Rehabilitation and Maintenance                                                                       |
| LSDZ           | laser surface danger zone                                                                                 |
| LVC            | Live, Virtual and Constructive                                                                            |
| LZ             | landing zone                                                                                              |
| MBTA           | Migratory Bird Treaty Act                                                                                 |
| MDCO           | Maneuver Damage Control Officer                                                                           |
| MDCP           | Maneuver Damage Control Program                                                                           |
| MEDDAC         | Medical Department Activity                                                                               |
| MEDEVAC        | medical evacuation                                                                                        |
| METL           | mission essential task list                                                                               |
| METT-TC        | Mission, Energy, Terrain, and Weather, Troops and Support Available, Time Available, Civil Considerations |
| MFF            | Military Free Fall                                                                                        |
| MGRS           | Military Grid Reference System                                                                            |
| MILES          | Multiple Integrated Laser Engagement System                                                               |
| MIM            | maneuver impact mile                                                                                      |
| MIPIM          | Mini Integrated Pointing Illumination Module                                                              |
| MMS            | mast mounted sight                                                                                        |
| MOA            | Military Operations Area                                                                                  |
| MOGAS          | Motor Gasoline                                                                                            |
| MOS            | Military Operational Specialties                                                                          |
| MOU            | Memorandum of Understanding                                                                               |

| <b>Acronym</b>  | <b>Definition</b>                                                                |
|-----------------|----------------------------------------------------------------------------------|
| MOUT            | Military Operations on Urban Terrain                                             |
| MP              | Midway-Razor-Rock outcrop Complex, 1 to 15 percent slopes                        |
| MS4             | Municipal Separate Storm Sewer System                                            |
| MSGP            | Multi-Sector General Permit                                                      |
| MSL             | mean sea level                                                                   |
| MSR             | Main Supply Route                                                                |
| MTBE            | methyl tertiary butyl ether                                                      |
| MTP             | Mission Training Plan                                                            |
| MTR             | Military Training Route                                                          |
| MvC             | Manvel silt loam, 2 to 6 percent slopes                                          |
| MyD             | Midway clay loam, 3 to 15 percent slopes, gullied                                |
| MzA             | Manzanola silty clay loam, saline, 0 to 2 percent slopes                         |
| MzB             | Manzanola silty clay loam, 0 to 3 percent slopes                                 |
| NAAQS           | National Ambient Air Quality Standards                                           |
| NAGPRA          | Native American Graves Protection and Repatriation Act                           |
| NAS             | National Airspace System                                                         |
| NAVAID          | Navigational Aid                                                                 |
| NDMC            | National Drought Mitigation Center                                               |
| NEPA            | National Environmental Policy Act                                                |
| NextGen         | Next Generation Air Transportation System                                        |
| NHPA            | National Historic Preservation Act                                               |
| NM              | Nautical Mile                                                                    |
| NOA             | Notice of Availability                                                           |
| NOI             | Notice of Intent                                                                 |
| NOT             | Notice of Termination                                                            |
| NOTAM           | Notice to Airmen                                                                 |
| NO <sub>x</sub> | oxides of nitrogen                                                               |
| NPDES           | National Pollutant Discharge Elimination System                                  |
| NPS             | National Park Service                                                            |
| NRCS            | Natural Resources Conservation Service                                           |
| NRHP            | National Register of Historic Places                                             |
| NWI             | National Wetlands Inventory                                                      |
| O/C             | Observer/Controller                                                              |
| O <sub>3</sub>  | ozone                                                                            |
| ODS             | Operation Desert Storm                                                           |
| OG              | Operations Group                                                                 |
| OIC             | Officer in Charge                                                                |
| OPFOR           | opposing force                                                                   |
| OPS             | Colorado Department of Labor and Employment, Division of Labor and Public Safety |



| <b>Acronym</b>    | <b>Definition</b>                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| OSS               | Operations Support Squadron                                                                                                                     |
| P2                | Pollution Prevention                                                                                                                            |
| PA                | Programmatic Agreement                                                                                                                          |
| PAM               | pamphlet                                                                                                                                        |
| PBN               | Performance Based Navigation                                                                                                                    |
| PCB               | Polychlorinated Biphenyls                                                                                                                       |
| PCMS              | Piñon Canyon Maneuver Site                                                                                                                      |
| PeD               | Penrose channery loam, 1 to 15 percent slopes                                                                                                   |
| PeF               | Penrose-Midway-Rock outcrop complex, 10 to 40 percent slopes                                                                                    |
| PER               | Personnel                                                                                                                                       |
| PETN              | Pentaerythritol tetranitrate                                                                                                                    |
| PIC               | pilot in command                                                                                                                                |
| PK15              | peak sound level that should not be exceeded 85 percent of the time within any given noise event evaluated under unfavorable weather conditions |
| PK50              | peak sound level that should not be exceeded 50 percent of the time within any given noise event evaluated under neutral weather conditions     |
| PM                | Penrose Minnequa complex, 1 to 15 percent slopes                                                                                                |
| PM <sub>10</sub>  | particulate matter less than 10 microns in diameter                                                                                             |
| PM <sub>2.5</sub> | particulate matter less than 2.5 microns in diameter                                                                                            |
| PNVS              | Pilot Night Vision System                                                                                                                       |
| POL               | petroleum, oils, and lubricants                                                                                                                 |
| psi               | pounds per square                                                                                                                               |
| PUB               | Pueblo Memorial Airport                                                                                                                         |
| RA                | restricted area (airspace)                                                                                                                      |
| RaB               | Ravine silty clay loam, 1 to 5 percent slopes                                                                                                   |
| RCIED             | Remote Controlled Improvised Explosive Device                                                                                                   |
| RCRA              | Resource Conservation and Recovery Act                                                                                                          |
| RDX               | Royal Demolition Explosive                                                                                                                      |
| RFMSS             | Range Facility Management Support System                                                                                                        |
| RLOS              | Radio Line of Sight                                                                                                                             |
| RMTK              | Range Manager's Toolkit                                                                                                                         |
| ROD               | Record of Decision                                                                                                                              |
| ROI               | region of influence                                                                                                                             |
| ROZ               | Raven Operational Zone                                                                                                                          |
| RSTA              | Reconnaissance, Surveillance, Targeting, and Acquisition                                                                                        |
| RTLA              | Range and Training Land Assessment                                                                                                              |
| RTN               | Raton Municipal Airport/Crews Field                                                                                                             |
| RUSLE             | Revised Universal Soil Loss Equation                                                                                                            |
| SA                | situational awareness                                                                                                                           |
| SAM               | surface-to-air missile                                                                                                                          |

| <b>Acronym</b>    | <b>Definition</b>                                         |
|-------------------|-----------------------------------------------------------|
| SAR               | Species at Risk                                           |
| SATB              | Simulated Airdrop Training Bundle                         |
| SBCT              | Stryker Brigade Combat Team                               |
| SDWA              | Safe Drinking Water Act                                   |
| SDZ               | Surface Danger Zone                                       |
| ShD               | Shingle-Penrose Complex, 2 to 15 percent slopes           |
| SHPO              | State Historic Preservation Office                        |
| SIL               | significant impact level                                  |
| SIP               | Statement Implementation Plan                             |
| SMA               | Standard Maneuver Area                                    |
| SME               | subject matter expert                                     |
| SO <sub>2</sub>   | sulfur dioxide                                            |
| SOF               | Special Operations Force                                  |
| SOP               | standard operating procedure                              |
| SPCC              | Spill Prevention Control and Countermeasures Plan         |
| SQHUW             | Small Quantity Handler of Universal Waste                 |
| SRA               | Sustainable Range Awareness                               |
| STORET            | storage and retrieval                                     |
| SUA               | Special Use Area                                          |
| SWMP              | Stormwater Management Plan                                |
| SWPPP             | Stormwater Pollution Prevention Plan                      |
| TAD               | Perry Stokes Airport                                      |
| TADS              | Target Acquisition and Designation Sights                 |
| TCP               | traditional cultural property                             |
| TEMF              | Tactical Equipment Maintenance Facility                   |
| TJS               | Tactical Jamming System                                   |
| TM                | Training Manual                                           |
| TMDL              | total maximum daily load                                  |
| TNT               | trinitrotoluene                                           |
| TSCA              | Toxic Substances Control Act                              |
| TRI               | Training Requirements Integration                         |
| TsD               | Travessilla sandy loam, 1 to 9 percent slopes             |
| TsF               | Travessilla-Rock outcrop complex, 25 to 65 percent slopes |
| UA                | unmanned aircraft                                         |
| UAS               | unmanned aerial system                                    |
| UAV               | unmanned aerial vehicle                                   |
| ug/m <sup>3</sup> | one-millionth of a gram per cubic meter                   |
| UGV               | unmanned ground vehicle                                   |
| USACE             | U.S. Army Corps of Engineers                              |

| <b>Acronym</b> | <b>Definition</b>                                                       |
|----------------|-------------------------------------------------------------------------|
| USAF           | U.S. Air Force                                                          |
| USAFA          | U.S. Air Force Academy                                                  |
| USAPHC         | U.S. Army Public Health Command                                         |
| USC            | United States Code                                                      |
| USDA           | United States Department of Agriculture                                 |
| USEPA          | U.S. Environmental Protection Agency                                    |
| USFS           | U.S. Forest Service                                                     |
| USFWS          | U.S. Fish and Wildlife Service                                          |
| USGS           | United States Geological Survey                                         |
| USLE           | Universal Soil Loss Equation                                            |
| UST            | Underground Storage Tank                                                |
| UXO            | unexploded ordnance                                                     |
| VC             | Virtual and Constructive                                                |
| VEC            | valued environmental component                                          |
| VFR            | Visual Flight Rules                                                     |
| VOR DME        | Very High Frequency Omni-Directional Range/Distance Measuring Equipment |
| VORTAC         | Very High Frequency Omni-Directional Range/Tactical Aircraft Control    |
| VR             | Visual Route                                                            |
| WM             | Minnequa-Wilid silt loams, 1 to 6 percent slopes                        |
| WQA            | Water Quality Act                                                       |
| WQCC           | Water Quality Control Commission                                        |
| WyB            | Wilid silt loam, 0 to 3 percent slopes                                  |

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## 1 **8 List of Preparers**

### 2 **Potomac-Hudson Engineering, Inc**

- 3 Cornwell, Camilla
- 4 M.S. Soil Science
- 5 B.S. Conservation of Soil, Water and
- 6 Environment
- 7 Years Experience: 10
  
- 8 Daly, Sarah
- 9 B.S. Environmental Science
- 10 Years Experience: 1
  
- 11 DiPaolo, Paul
- 12 B.S. Environmental Science and Policy
- 13 Years Experience: 4
  
- 14 McNutt, Erin
- 15 M.S. Ecology
- 16 B.S. Conservation
- 17 Years Experience: 4
  
- 18 Naumann, Robert
- 19 M.S. Environmental Management
- 20 B.S. Resource, Ecology and Management
- 21 Years Experience: 14
  
- 22 Sanford, Melissa
- 23 B.S. Meteorology
- 24 B.S. Business Management
- 25 Years Experience: 7
  
- 26 Shinkle, Deborah
- 27 B.A. Environmental Studies
- 28 Years Experience: 11
  
- 29 Spangenberg, Rachel
- 30 B.S. Biology
- 31 Years Experience: 25

### 32 **LPES**

- 33 Lavallee, Timothy
- 34 M.S. Civil/Environmental Engineering
- 35 B.S. Mechanical Engineering
- 36 Years Experience: 22

### 37 **New South Associates**

- 38 Gregory, Danny, M.A., RPA
- 39 M.A. Anthropology
- 40 B.A. Anthropology
- 41 Years Experience: 18
  
- 42 Joseph, J.W., PhD, RPA
- 43 Ph.D. Historical Archaeology
- 44 M.A. American Civilization
- 45 B.A. Anthropology
- 46 Years Experience: 38
  
- 47 Keith, Garce
- 48 M.A. Anthropology
- 49 Years Experience: 15

### 50 **Rexroad APG**

- 51 Rexroad, Joe
- 52 B.A. Architecture & Urban Design
- 53 Years Experience: 26

### 54 **Gryphon Environmental, LLC**

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- 56 B.S. Environmental Science
- 57 Years Experience: 23

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# **APPENDIX A**

## **NOTICE OF INTENT**



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16316

Federal Register / Vol. 79, No. 57 / Tuesday, March 25, 2014 / Notices

130, "Federal Agency Responsibilities for Maintaining Records About Individuals," dated February 8, 1996 (February 20, 1996, 61 FR 6427).

Dated: March 20, 2014.

Aaron Siegel,  
Alternate OSD Federal Register Liaison  
Officer, Department of Defense.

T-7207

**SYSTEM NAME:**

General Accounting and Finance  
System—Defense Travel Records  
(December 2, 2008, 73 FR 73246)

**CHANGES:**

**SYSTEM ID:**

Delete entry and replace with  
"T7207."

**SYSTEM NAME:**

Delete entry and replace with  
"General Accounting and Finance  
System—Defense Travel Records  
(GAFS-DTS)."

**SYSTEM LOCATION:**

Delete entry and replace with  
"Defense Information Systems Agency,  
Defense Enterprise Computing Center,  
7879 Wardleigh Road, Hill Air Force  
Base, Ogden, UT 84056-5997."

**CATEGORIES OF INDIVIDUALS COVERED BY THE  
SYSTEM:**

Delete entry and replace with  
"Defense Finance and Accounting  
Service civilian employees, United  
States Air Force (active duty, reserve,  
and guard members), Department of  
Defense civilian employees for the  
Defense Security Service, and the  
National Geospatial-Intelligence  
Agency."  
\* \* \*

**AUTHORITY FOR MAINTENANCE OF THE SYSTEM:**

Delete entry and replace with "5  
U.S.C. 301, Departmental Regulations;  
DoD Directive 5118.5, Department of  
Defense Financial Management  
Regulation (DoDFMR) 7000.14-R Vol. 4,  
Defense Finance and Accounting  
Service; 31 U.S.C. Sections 3512,  
Executive agency accounting and other  
financial management reports and plans  
and 3513, Financial reporting and  
accounting system; and E.O. 9397  
(SSN), as amended."

**PURPOSE(S):**

Delete entry and replace with "The  
system will enable the Defense Finance  
and Accounting Service, United States  
Air Force, Defense Security Service, and  
the National Geospatial-Intelligence  
Agency (NGA) to produce transaction-  
driven financial statements in support

of Defense Finance and Accounting  
Service financial mission."

**ROUTINE USES OF RECORDS MAINTAINED IN THE  
SYSTEM, INCLUDING CATEGORIES OF USERS AND  
THE PURPOSES OF SUCH USES:**

Delete entry and replace with "In  
addition to those disclosures generally  
permitted under 5 U.S.C. 552a(b) of the  
Privacy Act of 1974, as amended, these  
records contained therein may  
specifically be disclosed outside the  
DoD as a routine use pursuant to 5  
U.S.C. 552a(b)(3) as follows:

To the United States Department of  
the Treasury to report the financial  
status of the General and Working  
Capital funds.

To the Government Accountability  
Office (GAO) for audit purposes.

The DoD Blanket Routine Uses  
published at the beginning of the DFAS  
compilation of systems of records  
notices may apply to this system."

**POLICIES AND PRACTICES FOR STORING,  
RETRIEVING, ACCESSING, RETAINING, AND  
DISPOSING OF RECORDS IN THE SYSTEM:**

\* \* \*

**SAFEGUARDS:**

Delete entry and replace with "Access  
to records is limited to individuals who  
are properly screened and cleared on a  
need-to-know basis in the performance  
of their duties. Passwords and user  
identifications (CAC and PKI) are used  
to control access to the system data, and  
procedures are in place to deter  
browsing and unauthorized access.  
Physical and electronic access are  
limited to persons responsible for  
servicing and authorized to use the  
system."

**RETENTION AND DISPOSAL:**

Delete entry and replace with  
"Records are cut off at the end of the  
fiscal year, and destroyed in 6 years and  
3 months after cutoff. Records are  
destroyed by degaussing."

**SYSTEM MANAGER(S) AND ADDRESS:**

Delete entry and replace with  
"Defense Finance and Accounting  
Service-Columbus, I&T, System  
Manager, Cash, General Funds and  
Miscellaneous Division, 3990 E Broad  
Street, Columbus, OH 43213-1152."

**NOTIFICATION PROCEDURE:**

Delete entry and replace with  
"Individuals seeking to determine  
whether information about themselves  
is contained in this record system  
should address written inquiries to the  
Defense Finance and Accounting  
Service, Freedom of Information/  
Privacy Act Program Manager,  
Corporate Communications, DFAS—

ZCF/IN, 8899 E. 56th Street,  
Indianapolis, IN 46249-0150.

Requests should contain individual's  
full name, SSN for verification, current  
address, and provide a reasonable  
description of what they are seeking."

**RECORD ACCESS PROCEDURES:**

Delete entry and replace with  
"Individuals seeking access to  
information about themselves contained  
in this record system should address  
written inquiries to Defense Finance  
and Accounting Service, Freedom of  
Information/Privacy Act Program  
Manager, Corporate Communications,  
DFAS—ZCF/IN, 8899 E. 56th Street,  
Indianapolis, IN 46249-0150.

Request should contain individual's  
full name, SSN for verification, current  
address, and telephone number."

**CONTESTING RECORD PROCEDURES:**

Delete entry and replace with "The  
Defense Finance and Accounting  
Service (DFAS) rules for accessing  
records, for contesting contents and  
appealing initial agency determinations  
are published in Defense Finance and  
Accounting Service Regulation 5400.11-  
R, 32 CFR 324; or may be obtained from  
the Defense Finance and Accounting  
Service, Freedom of Information/  
Privacy Act Program Manager,  
Corporate Communications, DFAS—  
ZCF/IN, 8899 E. 56th Street,  
Indianapolis, IN 46249-0150."

**RECORD SOURCE CATEGORIES:**

Delete entry and replace with  
"Defense Travel System (DTS)."  
\* \* \*

[FR Doc. 2014-06479 Filed 3-24-14; 8:45 am]

BILLING CODE 5001-06-P

**DEPARTMENT OF DEFENSE**

**Department of the Army**

**Piñon Canyon Maneuver Site Training  
and Operations Environmental Impact  
Statement for Fort Carson, CO**

**AGENCY:** Department of the Army, DoD.

**ACTION:** Notice of Intent.

**SUMMARY:** The Department of the Army  
announces its intent to prepare an  
Environmental Impact Statement (EIS)  
to evaluate the environmental and  
socioeconomic impacts of proposed  
training and operations activities at  
Piñon Canyon Maneuver Site (PCMS),  
CO. The PCMS is the maneuver site for  
Fort Carson, CO. The PCMS is located  
near Trinidad, CO, approximately 150  
miles southeast of Fort Carson, and

consists of approximately 235,000 acres. The EIS will assess proposed PCMS training, infrastructure improvement, and land management activities to support Fort Carson training requirements. It will also assess the impacts of reclassification of the airspace that overlies PCMS. The proposed action does not include, nor would it require, expansion of PCMS.

**ADDRESSES:** Comments on the Proposed Action or requests for additional information should be sent to the Fort Carson NEPA Program Manager, Directorate of Public Works, Environmental Division, 1626 Evans Street, Building 1219, Fort Carson, CO 80913-4362, or call (719) 526-4666. Comments may also be submitted via email to: [usarmy.carson.incom-central.list.dpw-ed-nepo@mail.mil](mailto:usarmy.carson.incom-central.list.dpw-ed-nepo@mail.mil).

**FOR FURTHER INFORMATION CONTACT:** The Fort Carson Public Affairs Office at (719) 526-1289, Monday through Friday, 7:30 a.m. to 4:00 p.m. MST; or by email to: [usarmy.carson.hqda-ocpa.list.pao-officer@mail.mil](mailto:usarmy.carson.hqda-ocpa.list.pao-officer@mail.mil).

**SUPPLEMENTARY INFORMATION:** The EIS is being prepared to meet the requirements of the National Environmental Policy Act (NEPA) to evaluate the environmental and socioeconomic impacts of implementing proposed actions at PCMS.

PCMS supports readiness training for units up to Brigade-size stationed at Fort Carson and for visiting Reserve and National Guard units. Training must fully integrate ground and air resources and reflect the modern battlefield environment for which Soldiers are preparing. The PCMS must accommodate training for current and emerging tactics and new equipment; provide training infrastructure, land and airspace within PCMS necessary to support training requirements; and support assigned and visiting units.

Advances in equipment and weapons systems, to include their incorporation into tactical units, dictate changes in how the Army trains, alterations to ranges (including range airspace) for maneuver training and doctrinal changes to accommodate mission-essential training prior to global deployments. PCMS must support training that incorporates these technological and doctrinal changes.

The proposed action would accommodate additional training tasks and equipment to enable training of current and future Fort Carson units. Additional tasks and equipment include unmanned aerial and ground systems, jamming systems, laser target sightings, non-explosive mortars up to 120 mm, and non-explosive aerial gunnery.

Unmanned aerial systems would be reconnaissance systems, with no live-fire capability. The Army recently announced decisions to inactivate one Armor Brigade Combat Team (BCT), realign an Armor BCT and an Infantry BCT by adding an additional maneuver battalion to each, and convert the remaining Armor BCT to a Stryker BCT. The final configuration will result in three BCTs: One Armor, one Infantry, and one Stryker. PCMS must support the training needs of these BCTs. Reclassification of the special use airspace that overlies PCMS (not to extend over land outside the boundaries of PCMS) to restricted airspace is part of the proposed action. This reclassification is required to conduct integrated and realistic air and land training and to accommodate high-angle, indirect-fire weapon systems and airborne laser target sighting system training. This proposed reclassification would enable the safe integration of airborne systems (such as unmanned aerial systems) for force-on-force training. Artillery, high explosive aerial ordnance, and Stinger and Hellfire missiles will not be fired at PCMS. Non-dud producing munitions fired from aerial systems, including 5.56mm, 7.62mm, .50 caliber, 20mm, 30mm, 2.75" inert rockets, none of which exceed 81mm, will not produce residual unexploded munitions.

The proposed action could have significant impacts to airspace, soil erosion, wildfire management, cultural resources, and water resources. Mitigation measures will be identified for adverse impacts.

The proposed action only considers activity within the boundaries of PCMS. The proposed action does not include, nor would it require, any expansion of PCMS. No additional land will be sought or acquired as a result of this action.

In addition to analyzing reasonably foreseeable cumulative impacts, which could include additional site infrastructure capable of hosting more local support staff, the EIS will also analyze a No Action Alternative. Under the No Action Alternative, current mission activities and training operations would continue, as well as range use and training land management. Management would continue to include routine maintenance and natural resource sustainment activities. This alternative, required by NEPA, encompasses baseline conditions and will serve as a benchmark against which the environmental impacts of the proposed action can be compared. Other

reasonable alternatives will be considered for evaluation in the EIS.

Scoping and public comments: Governmental agencies, interest groups, and individuals are invited to participate in the scoping process. Public meetings will be held in Trinidad and La Junta, Colorado. Information on the time and location of the public meetings will be published locally. In addition, the Army will engage in consultation with federally recognized Native American tribes regarding the proposed action. The scoping process will help identify possible alternatives, potential environmental impacts, and key issues of concern to be analyzed in the EIS. It will also eliminate issues which are not significant or which have been covered by prior environmental reviews from detailed consideration. Written comments will be accepted within 30 days of publication of the Notice of Intent in the Federal Register.

Brenda S. Bowen,  
Army Federal Register Liaison Officer.  
[FR Doc. 2014-06428 Filed 3-24-14; 8:45 am]  
BILLING CODE 3710-08-P

## DEPARTMENT OF DEFENSE

### Department of the Navy

**Notice of Extension of Comment Period for the Draft Environmental Impact Statement/Overseas Environmental Impact Statement for Military Readiness Activities in the Northwest Training and Testing Study Area**

**AGENCY:** Department of the Navy, DoD.  
**ACTION:** Notice.

**SUMMARY:** A notice of availability was published by the U.S. Environmental Protection Agency in the Federal Register (79 FR 4158) on January 24, 2014, for the Northwest Training and Testing (NWT) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). The public comment period ends on March 25, 2014. This notice announces a 21 day extension of the public comment period until April 15, 2014.

**FOR FURTHER INFORMATION CONTACT:** Naval Facilities Engineering Command Northwest, Attention: Ms. Kimberly Kler—NWT EIS/OEIS Project Manager, 1101 Tautog Circle, Suite 203, Silverdale, WA 98315-1101; or <http://www.NWTTEIS.com>.

**SUPPLEMENTARY INFORMATION:** The public comment period on the NWT EIS/OEIS will be extended until April 15, 2014. Comments may be submitted

# **APPENDIX B**

## **Cultural Resources Supporting Documentation**

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# **APPENDIX B**

## **Table of Contents**

|                                                                                                     |      |
|-----------------------------------------------------------------------------------------------------|------|
| B1. Pre-historic, Proto-historic, and Historic Cultural Sequences for Fort Carson and the PCMS..... | B-5  |
| B2. Section 106 Consultation Documents.....                                                         | B-65 |

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## **B1.**

# **Pre-historic, Proto-historic, and Historic Cultural Sequences for Fort Carson and the PCMS**



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## Prehistoric, Proto-historic, and Historic Cultural Sequences for Fort Carson and the PCMS

### Prehistoric Cultural Sequence

***Pre-Clovis: 11,500 Years Ago and Before:*** Recently, researchers have agreed that people were present in the New World prior to well-established Clovis tradition. Among locations that have been accepted are the Cactus Hill site in Virginia, 18,000-20,000 years old, the Manis site in Washington at 13,800 years old, and the Buttermilk Creek site in Texas, dated to 15,500 years ago. Too little has been reported to provide a reliable picture of the life ways of pre-Clovis people, although differences exist between sites that could suggest groups with different origins, practices, and technologies (Europe, South Pacific, and Eastern Asia). In addition, the data is too sparse to know which sites, if any, were occupied by people whose descendants represent the Clovis and later traditions. While possible pre-Clovis sites, like Lamb Spring, Dutton, and Selby, have been reported in Colorado, they all have contextual issues that prevent their unequivocal acceptance as pre-Clovis sites.

To date, no pre-Clovis sites have been identified on Fort Carson or PCMS. However, it is possible such sites could be identified in locations where Pleistocene landforms or deposits are preserved and being exposed. These type sites would be irreplaceable scientific discoveries, worthy of enhanced protection, listing on the National Register, and recruitment of National experts to develop a research design for study.

***Paleoindian Stage: 11,500 – 7,800 Years Ago:*** The Paleoindian Stage represents the earliest well-documented period of human occupation in North America, including Colorado. This stage is typically divided into three temporally sequential periods with Clovis being the earliest, followed by Folsom, and finally by Plano. Paleoindian people are generally thought of as mobile hunters who followed the migrations of herds of large mammals, like mammoth and species of bison, which are now extinct. However as new evidence accumulates, it appears that these people had a more diversified subsistence than simply focusing on large extinct fauna. In addition, people in each period developed and used different stone tool technologies, particularly evident in the stone points used on their hunting tools. While this period is widely accepted, sites are still sparse; so much is still unknown about the life ways of people during this stage. Important sites from all three sub-periods are present in the region around Fort Carson and the PCMS.

There are 12 documented sites with Paleoindian stage artifacts on Fort Carson, with 7 additional Isolated Finds (IFs). Sixty-three sites at the PCMS contain artifacts from the Paleoindian stage, also with 7 IFs. While it is likely that some of the remaining sites at both facilities contain substantial Paleoindian components, this has not been established to date, and many of the Paleoindian components likely represent recycled or curated points by later peoples, based on inspection of the items in the collection. Only thorough testing and re-evaluation of these sites can determine whether substantial Paleoindian components are actually present.

Like pre-Clovis sites, Paleoindian sites are rare and invaluable, particularly in southern Colorado. These sites represent significant resources and would also attract outside funding sources and researchers to assure their protection and study.

**Archaic Stage: 7,800 – 1,850 Years Ago:** The Archaic Stage in southeastern Colorado is also composed of three periods; Early Archaic, Middle Archaic, and Late Archaic. In general, these periods are largely predicated on changes in the form of stone projectile points, as people throughout the stage seem to live similar lives. However, changes in the environment, land use, or population size occur as well. While there appears to be continuity in group size and subsistence practices from the Plano period into Early Archaic, shifts transpire in the size of the region's population, land use, and types of species hunted. The Early Archaic coincides with a long period of dryer conditions on the plains, during which bison populations dwindled or migrated into the area less. Human populations are still present but seem much reduced on the plains and more prevalent in the foothills and mountains. With less bison available, other game species were hunted in greater proportions.

The beginning of the Middle Archaic coincides with amelioration of the dry period and a return of some bison to the region. Human populations grew, as did the number of known sites, which are primarily located near water sources across the region. A single projectile point tradition dominates the region, suggesting the migration or spreading of a group back into the region as climatic conditions improved. The use of shallow ephemeral structures for shelter appears to become common and subsistence practices incorporate a broad spectrum of plant and animal resources, leading to an increase in the presence of ground stone tools.

During the Late Archaic an increase in the number and range of sites suggests increased population growth and greater familiarity with, and use of, the region's animal and plant resources. An explosion in the diversity of projectile point types marks the beginning of the period. This trend in the diversity of hunting tools, typically associated with men, could mark the development of territorial identity groups. There is evidence that habitation structures have more investment, suggesting longer seasonal occupation or repeated occupations. Ground stone is common and domesticated plants, like corn, appear in small amounts within subsistence remains. This later fact is also suggestive of the development of territories, in that people settled on the landscape to a degree that they invested time into agriculture, which would require at least a moderate effort to plant and harvest, if not to protect.

Similar to Paleoindian period sites, sites with Early Archaic deposits are rare and extremely important. Fort Carson contains 15 sites with components of this age and 63 have been recorded on the PCMS. At a few sites on both facilities there are buried cultural layers dated to the Early Archaic that hold great potential to provide valuable information regarding human occupation of the region during this period.

Middle Archaic and Late Archaic sites are more prevalent. Excluding Isolated Finds (IFs), Fort Carson contains 45 sites with Middle Archaic components and 84 sites with Late Archaic Components. The PCMS contains 213 sites with Middle Archaic components and 348 with Late Archaic components. Still, few of these sites have been excavated or tested. The association of sites with these periods is based primarily on temporally diagnostic artifacts from site surfaces. Only 5 sites on each facility contain known cultural deposits dated to the Middle Archaic period. As regards Late Archaic deposits, there are 16 known sites on the PCMS and 8 on Fort Carson. It seems likely that more sites with Archaic-stage components will be identified in the future through testing during survey and re-evaluation work. While important, these sites are not as likely to attract outside funding because they do not draw public and academic attention compared to Paleoindian sites. None-the-less, targeted recruiting of academic researchers who can garner grant money may prove productive.

**Late Prehistoric Stage: 1,850 – 500 Years Ago:** Following the trend, the Late Prehistoric stage is also divided into three periods; the Developmental, the Diversification, and the Proto-historic periods. In general, the climate and environment in the region is stable from the Middle Archaic through to historic times, and people seem to practice relatively similar life ways that entails seasonal residential mobility predicated on broad spectrum hunting and gathering. During the Late Prehistoric Stage, a number of changes occur that suggest people are becoming less residentially mobile and more fully adapted to the landscape. Through time, there is a general trend in increased investment in architecture, evidence of larger, more complex sites, and diversification in site types. This suggests that people are beginning to aggregate into more permanent villages from which groups disseminate seasonally, or as required, to temporary camps and localities to access resources. Also suggestive of greater sedentism is the adoption of ceramic technology, which would not be practical for highly mobile groups because of the breakage potential.

Besides the adoption of ceramics, there are a number of other practices that appear during this period. A major technological change that marks the beginning of the Late Prehistoric Stage is the adoption of the bow and arrow, evidenced by a measurable decrease in the size of projectile points. Architecture becomes more formal with structure sizes increasing and prepared stone wall foundations becoming common. Finally, this period provides the first evidence for the use of local freshwater mollusk for food and ornamentation.

Specific trends separate the three periods of this stage. The Diversification period is the first episode where manifestations of two separate cultural groups (Apishapa and Sopris) occurs, suggesting a more complex social landscape. A major difference between these groups is the style of architecture each used. While the architecture of both groups is complex and often contains multiple rooms, Apishapa structures are round and tend to incorporate vertical masonry, while Sopris structures are rectangular with horizontally lain masonry. The Protohistoric period is largely un-documented, but encompasses the time between the proposed Apishapa abandonment and Apachean occupation of the region and the Apache abandonment of the region under pressure from Comanche and Ute warfare. Few sites are reliably associated with the Protohistoric period, but those that are typically exhibit architecture evidenced by spaced stone rings of rock (tipi rings) and the presence of micaceous pottery (pottery with abundant mica flakes in the paste).

Fort Carson and the PCMS contain many of the more important tested and excavated sites known from the Late Prehistoric stage in the region. In fact, the majority of the known important Proto-historic sites are located on the PCMS. What is known about the Late Prehistoric Stage and its periods is based largely on the excavation and testing of a handful of sites, so the recovered data cannot be considered representative of the life ways of peoples that occupied the region during this temporal span. Thus, any site with in-tact deposits can hold significant data that would advance the knowledge of these past people, and as such, should be managed for preservation or recovery of its research potential. Again, these sites are not as likely to attract outside funding because they do not draw public and academic attention compared to Paleoindian sites. None-the-less, targeted recruiting of academic researchers who can garner grant money may prove productive in the management and preservation of these sites.

## Proto-historic Sequence

**Protohistoric Period: 500 – 225 Years Ago:** The Proto-historic Period extends from roughly 1450 A.D. to 1725 A.D. The earliest European incursions into the region occurred

during the first half of the sixteenth century, and the material cultures of indigenous populations were altered significantly over the course of the ensuing three centuries. Three principal indigenous groups entered southeastern Colorado during this period. In chronological order of appearance, they are the Apache, Comanche, and Cheyenne-Arapaho. In addition, southeastern Colorado was on the margin of Ute territory throughout proto-historic times.

The Proto-historic Period marks the start of the Plains Nomad Tradition. Material remains include metal artifacts, micaceous pottery, Pueblo pottery, chipped glass artifacts, and side-notched points. Most sites from this period are tipi encampments found along canyon heads though some earth ovens have been found. Spanish expeditions onto the southern Plains reported groups of nomadic bison hunters that also subsisted on corn, other large and small game, native plant seeds, greens and tubers, mussels and fish.

In eastern Colorado, the Dismal River Aspect has been proposed for the remains recovered for the time period between A.D. 1675 and A.D. 1725. The Dismal River Aspect has been associated with Plains Apachean peoples based on the previously mentioned Spanish accounts. Recently, Gulley (2000:7) has called into question the validity of these accounts and has determined that sites attributed to Dismal River actually represent a local manifestation of a Plains life way, rather than a definitive Apachean presence.

Tipi rings sites are common throughout the southern Plains, but only a few of them can be attributed to the Protohistoric. Sites on the Carrizo Ranches near the Colorado/New Mexico border have tipi rings and diagnostic pottery. Protohistoric ceramics have also been found at two sites on the PCMS.

## Historic Cultural Sequence

Within southern Colorado, the initial European contact occurred mid 16<sup>th</sup> century. The Late Prehistoric aboriginal way of life probably changed little until the Spanish began settling in the region. Following Zier and Kalasz (1999), the transition between the Protohistoric to the Historic begins around A.D. 1725. Though there is a paucity of ethnographic and historical data for the region, records document aboriginal/European contact beginning with Fray Marcos DeNiza's expedition of 1539.

Archaeologically, the recognition of Historic Indian sites in the region has been rare. Because of this, only the European cultural history will be discussed. The following description of the historic cultural chronology is largely taken from Clark (2003), Mehls and Carter (1984), Jones et al. (1998), Zier and Kalasz (1999), and Zier et al. (1997), though other, less known sources are also consulted.

***Spanish Period (A.D. 1540 – A.D. 1822):*** Initial European exploration into southeastern Colorado was associated with Spanish colonialism. In 1539, Viceroy Medoza sent Fray Marcos DeNiza to investigate the “Seven Cities of Cibola” described by Cabeza DeVaca. In 1540, Francisco Coronado led another large expedition in search of the Seven Cities as far north as south-central Kansas. Though neither of these expeditions actually crossed into Colorado, the entire region became part of the territory claimed by Spain in the New World.

Through the late 16<sup>th</sup> century, there were other Spanish expeditions into the southern Plains. In 1598, Don Juan Onate sent Vincente de Zaldivar into southern Colorado and the Juan de Archuleta made the first documented trip into Colorado around 1664 when retrieving Taos Indians from El Cuartelejo. The Purgatoire River is said to have received its name because

Spanish soldiers had died here and did not receive last rites. Perhaps members of the Bonilla and Humana expedition of 1594 were the servicemen mentioned in this account. The river's Spanish name, "Rio de las Animas", means river of souls, to which was later added "Perdidas en Purgatorio," or lost in Purgatory. Records indicate that Gutierrez de Humana killed Captain Fransisco Leyva de Bonilla along the Arkansas River in Kansas, however, while returning to Pecos Pueblo the rest of the group was attacked by Indians and most of the Spanish Soldiers were killed. The majority of scholars confirm that the Humana expedition went into Kansas and not Colorado, but a skeleton in Spanish armor found in a canyon near La Junta and chain mail found in the area collaborate nicely with the legend.

The migration of the Utes and Comanches was part of a broader pattern of rapidly shifting tribal territories, a pattern which had begun before the Spaniards reached the region and continued into the late-nineteenth century. The Uto-Aztec speaking Ute Indians may have been the first historic tribe to enter Colorado when they migrated southeastward from the Great Basin. Following herds of bison, and because of ameliorating climatic conditions, Apaches entered the area from the north by the beginning of the 16<sup>th</sup> century. Other Athabaskans, Navajos, migrated to extreme southern Colorado and northern New Mexico at this time. The Navajos and Apaches conducted both trade and warfare with the older pueblo groups further to the south. By the 1660s, the Apaches had become a mounted military threat to the Pueblos and the Spanish in what Secoy (1953) calls the Post-Horse-Pre-gun pattern. The Utes also had horses in the 1700s and they too began to raid New Mexico villages.

The first documentation of mounted Indians with armor occurred around the time of the 1680 Pueblo Revolt. The revolt had little direct impact north of New Mexico, though Spanish exploration into the area ceased as both soldiers and settlers retreated into Mexico. Within a few years, the Spanish regained control of the Rio Grande area and exploration into territories to the north resumed.

In the 1700s, French traders operating on the northern Plains and along the Mississippi River began to trade goods and arms to the various Indian groups including members of the Pawnee family and the Comanche. These enemies of the Apache pushed back across the southern Plains, and along with the Ute's who had guns at this time, established military dominance. This is because the semi-sedentary Apache were tied to crops on a seasonal basis and their more mobile, and better equipped, adversaries could pattern their locations and dominate calvary warfare.

In 1704, the Comanches began to raid Spanish settlements in New Mexico and used the Purgatoire River area as a staging point for their trips. Competition between Comanches and Utes for the upper Arkansas River basin eventually led to general warfare between those former allies, with the remaining Apaches allied with the Utes.

The Spanish military pattern at this time was one of infantry and calvary and expeditions into the southern Plains a show of force. To control the Indians of the southern Plains, and to assess French influence in the area, Spanish leaders dispatched a party lead by Antonio de Valverde in 1717 and Pedro de Villasur in 1729. On the Platte River of Nebraska, Villasur's party was attacked by the Pawnee and was the last Spanish expedition across eastern Colorado until 1779.

The French Canadian brothers, Paul and Peter Mallet, are credited with the first expedition up the Arkansas and Purgatory River valleys while traveling to Santa Fe in 1739 to establish a trade route. On the journey, they apparently found stones bearing Spanish inscriptions on the

banks of the Arkansas River. Although their exact route is not known, they may have followed the prehistoric Indian trade route, which would later become known as the Santa Fe Trail.

In the 1770s, Comanche and Apache raiding parties terrorized the edge of the Spanish frontier. To combat these attacks, Governor Juan Bautista de Anza led an army of 600 soldiers, militiamen, and Indian allies against the Comanche. They ambushed a large Comanche camp on the north side of the Wet Mountains in south central Colorado, then traveled south to near the present town of Rye where routed another Comanche force led by Cuerno Verde.

This Spanish victory initiated lasting peace with the Comanche in 1786. This new alliance led not only to the demise of the Apache on the Plains, but began the *Comanchero* period (1786 to 1860) where the Spanish, New Mexicans, and Comanche came together for trading on the southern plains. At the same time, New Mexican buffalo hunters known as *ciboleros*, hunted throughout the region.

The French threat to the Spanish in the southern Plains disappeared in 1763. Napoleon, in the early 1800s, needed money to support the French Empire elsewhere, and came to an agreement with Spain to return the former French colony of Louisiana to France. In 1803, in one of the greatest land deals of its time, France sold the recently secured Louisiana to the United States. The boundaries of the Louisiana, largely disputed by Spain, but claimed by the United States included the land extending west from the Mississippi River to the Rocky Mountains and the Rio Grande. It was not until 1819 that the Adams-Onís Treaty would established the Arkansas River as the northern boundary of Spanish New Mexico.

President Jefferson did not waste any time in procuring federal funding for scientific expeditions to explore the natural resources, and to gain knowledge of the Indians, and the transportation routes of this uncharted territory. One of the first explorations, the renowned Lewis and Clark Expedition (1803-1806), explored the area along the Missouri River and the Northwest region. Two later expeditions that followed are directly associated with the Fort Carson area. The expedition of Captain Zebulon Pike (1806) explored the geography, natural history, and topography of the lands in the southwest portion of the newly acquired territory, leading Pike up the Arkansas River Valley into Colorado. The entourage of twenty-two men split into two groups, one to seek the headwaters of the Red River, and the other along the Arkansas River. During this expedition Pike would observe the mountain peak that bears his name today. Pike and three other men continued northwest in an attempt to climb the peak looming on the horizon, an attempt that proved unsuccessful. This venture possibly led him to the area of Little Fountain Creek, and on his return journey to the mouth of Fountain Creek the group possibly went by way of Turkey Creek. A winter camp described by Pike believed to have been located east of Colorado Highway 115 between Turkey Creek and Little Turkey Creek within the Fort Carson area has not been archaeologically verified.

After the official boundaries of Louisiana were established, Long's expedition (1820) would explore the western mountains in search of the source of the Platte River, returning by way of the Arkansas and Red Rivers. Three of the men in Long's expedition would be the first Americans to climb what Long referred to as James' Peak, but would forever be referred to by the public as Pike's Peak. Long's expedition skirted the eastern boundary of Fort Carson.

Fur trappers and traders were among the first Euro-Americans to venture forth in this unknown land, exploring the region in the process of economic enterprise. Trading and trapping networks had been in place by the early 19<sup>th</sup> century, and while private parties of New Mexico traders were encouraged by Spanish authorities to travel north and east to trade with the Indians,

American traders were not always welcomed to trade in Santa Fe. When American traders did venture to Santa Fe, the Spaniards confiscated their goods and detained them, some for as long as a decade. James Purcell explained to the captured Pike in 1807 that after coming from Missouri and traveling up the South Platte to South Park he and two French-American traders turned southward to trade their furs in Santa Fe. Upon arriving there, Spanish authorities appropriated their goods, and did not allow them to leave.

The Missouri Fur Company, in 1809-1812, did not intend to have its trappers detained in New Mexico and sent parties of trappers into the Rocky Mountains. Jean Baptiste Champlain led one party up the South Platte River bringing news back to St. Louis of a thriving beaver population and Arapaho Indians eager to trade. He returned to the South Platte area in 1811, and his party of trappers dispersed into different areas where they learned of the hostilities of the northern Plains Indians towards Americans resulting from British incitement during the War of 1812. In 1821, the Mexicans overthrew the Spanish during the Mexican Revolution.

***Mexican Period (A.D. 1822 – A.D. 1848):*** The Mexican Period coincides with much of the early American presence in the Colorado territory. In the spring of 1821, Spain granted Mexico independence as addressed in General Agustín de Iturbide's publication of the *Plan of Iguala*. While the news of independence spreads quickly through Mexico, it was not until September that Santa Fe learned of freedom from Spanish rule. New Mexico officials quickly endorsed independence, with no show of opposition. After the long imposed monopoly on the price of merchandise shipped to New Mexico by Chihuahua merchants, Santa Fe was eager to reverse Spanish policy against transactions with foreign merchants. Aware of the advantages that trading with the United States could bring, New Mexico eagerly sought the business of American traders from the northern frontier.

Upon learning of the new opportunities in Mexico, William Becknell, who had set out in 1821 from Missouri to trade with the Comanches, traveled on to Santa Fe. His route across the plains and over Raton Pass became the Mountain Branch of the Santa Fe Trail. The Santa Fe Trail provided a trade route that linked Independence, Missouri with Santa Fe, New Mexico. The Mountain Branch of the Santa Fe Trail more or less runs along State Highway 350 and the Timpas Creek drainage on the south side of Pinon Canyon. Shortly thereafter, many other traders made their way to sell merchandise to the New Mexico market. Establishment of a viable fur trade in the region brought about exploration of previous sections of unknown territory, thus expanding the geographical knowledge of the mountain west.

As the door opened for trade in New Mexico, the price of furs was rising in the United States, which brought with it a renewed interest in the fur trade. American fur traders ventured into New Mexico to hunt the plentiful beaver found in the streams of the Pecos and Rio Grande Rivers. In 1823, Mexican soldiers warned trappers of Baird and Company working the drainage of the Colorado River Basin that there were laws against foreigners trapping beavers in Mexican waters. When officials in Mexico City learned in 1824 that an American trapping network had developed in New Mexico, they ordered the government to prevent trapping of furs by foreigners in Mexican territory. American trappers, however, continued to trap New Mexico's waters by obtaining licenses granted to them in the names of Mexican citizens by Governors Baca and Narbona, provided a group of Mexicans joins the trappers to learn the fur trade. Due to pressures from Mexico City in 1826, Narbona revoked licenses and confiscated furs. American trappers did not easily give up the rich trapping areas in New Mexico, and many found ways around the law like smuggling furs by alternative routes, or by obtaining Mexican citizenship. Many American trappers, however, moved on, as early as 1827, into the Rocky Mountains to work the mountain streams for beaver. The "golden era of beaver trapping" dates between 1828



and 1833. The demand for beaver fur fell from favor in the early 1830s, replaced by the demand for the hide of the American bison, which lasted close to three decades.

The success of the fur trade brought about the construction of many trading posts inside the United States territory north of New Mexico. Entrepreneurs such as William and Charles Bent and John Gantt established trading posts along the Upper Arkansas River between 1821 and 1835. The most successful trading post, and strongest competitor of Taos, was Bent's Fort, established in the early 1830s by the Bent, St. Vrain and Company on the north side of the Arkansas River. The location of the fort increased usage of the Mountain Branch of the Santa Fe Trail, and encouraged initial attempts of the first permanent settlements in the region.

As the fur trade waned in the late 1830s, many trading posts continued to serve as supply stops along established trails and trade routes. Agricultural settlement of the region coincided in conjunction with fur trading activities. Small farming communities settled at Pueblo and other locations along the Arkansas River and its north-flowing tributaries in the 1830s and 1840s. Corn and other produce of these farms found a ready market at the fur trading posts, and most farms were located close to at least one of the various segments of the Santa Fe and Taos Trails. As the fur trade became less lucrative many fur traders gave up their roaming lives and some with Spanish or Indian wives settled down to farm. Food demands of Bent's Fort encouraged Mexican traders (*comancheros*) in 1839 to establish the first Mexican settlement, Fort El Pueblo, five miles upstream of Bent's Fort, where they raised grain, vegetables, horses and mules. Around 1842, trappers and mountaineers started a settlement at the site of present day Pueblo where they farmed and traded with the Indians. A similar settlement started about the same time near the mouth of Hardscrabble Creek, near present day Florence.

Sites associated with the fur trade are lacking within the boundaries of Fort Carson Military Reservation. The absence of well-traveled waterways or an overland route necessary for the existence of a fur trading post indicates little promise that anything other than ephemeral interactions with the area existed. Archival evidence does not indicate the existence of fur trading posts in the area. One site, 5PE64, was erroneously identified as an 1820s-1830s "Bent's Stockade" by amateur historian C. W. Hurd in 1960. Archival, architectural and archaeological evidence indicated the site is the remains of a small ranch established in the late 1860s or early 1870s. Review of archival sources or physical contexts fail to indicate establishment of a fur trading post near the location of site 5PE64 or anywhere else within Fort Carson. A number of streams run through the Fort Carson area to include, Fountain Creek, Little Fountain Creek, Little Turkey Creek, Red Creek, Sand Creek, and Turkey Creek. While trappers probably worked the streams throughout Fort Carson, their temporary campsites most likely have been lost through natural processes or latter human interaction with the land.

The Arkansas River was the international boundary of the Louisiana Territory from 1819 to 1848. To promote settlement in Mexico's northern frontier, the Mexican government issued a series of land grants between 1833 and 1843 to individuals for the development of towns and natural resources. Mexico established three large land grants in 1843. The Sangre de Cristo Grant, a million acre tract in present Costilla County extended into New Mexico. The Nolan Grant encompassed an area south of Pueblo, and the Virgil and St. Vrain Grant, extended east of Pueblo to the Purgatory River and south of Trinidad. Prior to 1843, individuals received from Mexico the Maxwell Grant, south of Trinidad into New Mexico, and the Tierra Amarilla Grant, southwest of the San Juan Mountains.

Before the establishment of any permanent Mexican settlements, the land grants transferred to the United States in 1848 after the war with Mexico. The treaty between the United States and

Mexico honored the land and property rights of the individuals who held the Sangre de Cristo, Maxwell, and Tierra Amarilla grants. Congress reduced the size of the Nolan, and the Virgil and St. Vrain Grants, and did not ratify the Conejos Grant. The Navajo and Ute thwarted earlier attempts (1833 and early 1840s) to settle the Conejos Grant. Hispanic *pobladores* migrated from northern New Mexico to develop towns within the Sange de Cristo Grant along the Costilla River (1849), and San Luis (1851), San Pedro (1852), and San Acacio (1853) and the Culebra River. Humble farmers raised families, tilled the soil with crude wooden plows, dug irrigation ditches, and raised crops of wheat, corn, and beans. These small Hispanic communities were the first permanent agricultural settlements in Colorado. By 1860, more than 2,000 emigrants had settled in the area establishing at least forty irrigation ditches.

***American Frontier (A.D. 1849 - A.D. 1858):*** The Mexican War officially ended in 1848, with the Treaty of Guadalupe Hidalgo. The United States annexed the Mexico territory from Texas to the Pacific Ocean, from the Rio Grande to the forty-second parallel, the present American Southwest, including the area of Colorado south of the Arkansas River. The postwar period brought several significant changes resulting in permanent occupation of the region. American population in Colorado increased as a direct result of gold and silver mining and emigrants seeking fortunes through mineral prospecting in California, or settling on farms or ranches in Utah and Oregon. While wagon wheels continued to furrow deeply along the Santa Fe Trail, the flow of emigrants heading to Oregon, California, and Utah (1840 – 1850), the rush to gold fields and cattle drive routes contributed to the emergence of formal communication and transportation systems, linking frontier posts and villages. Frontier building increased hostilities between emigrants and the indigenous tribes eventually resulting in systematic removal of the Indians as early as the 1860s.

Enthusiastic reports brought back by Lewis and Clark in 1806 of the fertile valleys of Oregon, and the Fremont expeditions (1842, 1843 and 1844) returning with maps of the major trails over the mountains to Oregon and California territories, encouraged many emigrants to head west. The Fremont expedition of 1842 employed the seasoned frontiersman Kit Carson as their guide to survey the area between the Missouri River and South Pass for passable routes and sites for the development of military posts. Bent's Fort established in the 1830s continue to serve as a portal from which many expeditions and emigrants began their journey into the western frontier.

Originally, emigrants made the journey west in search of land to establish farms and ranches. The discovery of gold in 1848 on a ranch belonging to John Sutter in California altered the purpose and demographics of those traveling west changed. By 1849, the gold rush brought many seekers of fortune over the Great American Desert and the Rocky Mountains. In 1846, Mormons in search of a heavenly fortune sought a "homeland" to practice their beliefs began their trek west establishing their haven in the Great Salt Lake Basin of Utah. In 1846, near Pueblo, a temporary settlement was set up for sick and disabled soldiers of the "Mormon Battalion" who had enlisted in the United States army during the war with Mexico to spend the winter. They left their log cabins and church in the spring of 1847 and traveled northward to the Oregon Trail with their final destination Salt Lake City, Utah.

While Fort Carson is not located along the most frequently traveled Oregon Trail that took emigrants through central Wyoming, or the Overland Trail through northeastern Colorado and southern Wyoming, important "feeder" trails of the Oregon Trail did traverse through the immediate Fort Carson area. A number of exploration parties traveled along the Fountain Creek route: George Ruxton (1847), the Sumner Kansas Territory Survey (1857) and the Hayden Geological Survey (1873). The Cherokee Trail may have originated as early as 1849 with the Evans party of 124 gold prospectors, including 15 Cherokee Indians, on their way to the gold

fields north of Denver. The trail followed along Fountain and Jimmy Camp Creeks to the headwaters of the South Platte drainage, then north to Denver. The trail became a frequently used thoroughfare after 1858, as news spread quickly through the Kansas and Missouri frontiers of the discovery of gold in the Pikes Peak area. Following the path of the gold prospectors, came freight wagons with needed supplies to outfit and feed those seeking their fortunes.

Eastern Colorado, from 1854-1855, was part of the Kansas and Nebraska Territories, a region largely unsettled by Euro-Americans, with no established civil government. Scattered Euroamerican settlements emerged in the Arkansas Valley during the early 1850s. Early settlers included “Uncle Dick” Wooten, Joseph Doyle, and Charles Autobees. Communication between the United States and its new territories was a necessity; thus in 1850 the U.S. government established the first mail contract between Independence, Missouri and Santa Fe, New Mexico. Settlement, along with the appearance of smallpox, increased tensions between Native Americans and emigrants. Indian hostilities often caused abandonment of early settlements and ranches before the decade of the 1850s closed, and prior to the 1858 Colorado gold rush.

Indian populations adapted to the limited presence of American traders and fur trappers along the South Platte and Arkansas River drainages, but became more agitated as Americans began to extensively travel through and settle in the Colorado Territory. The Treaty of Fort Laramie established in 1851 between the United States government and nine Plains tribes allowed Americans the right to build forts and roads within the tribal territories. The tribal territories agreed upon in the treaty set aside eastern Colorado from the Arkansas River to the North Platte River in Wyoming for the Cheyenne and Arapahoe. The central Rockies and the western slope was the land of the Ute, who resisted the gradual emigration of Hispanic American groups from New Mexico into the San Luis Valley. The U.S. Army erected Fort Massachusetts in 1852 to protect the settlers from Indian hostilities. On Christmas Day in 1854, the Muache Ute and their Jicarilla Apache allies attacked the trading post at Pueblo, killing most of the residents.

Increased traffic along the Santa Fe Trail and the establishment of the cattle drive routes in the new territory created further problems with Native American populations. In June 1860, the War Department ordered construction of a military fort at Big Timbers (known as Fort Lyon after the Civil War). Nevertheless, the situation between settlers and Native Americans continued to degenerate. In 1861, under pressure from the U.S. Government and white settlers, the Cheyenne and Arapahoe surrendered in the Treaty of Fort Wise the bulk of their land, which included the heart of their hunting lands at the base of the mountains. While most of the Cheyenne peace chiefs, lead by White Antelope and Black Kettle, supported the agreement, many of the young men and members of the warrior society claimed they had not agreed to the cessation of their land. The amount of game necessary to support the tribes was not plentiful enough on the fraction of the land north of the Arkansas allotted to the tribes. Stealing livestock from farms and ranches became a way to supplement the lack of game.

In the spring of 1864, Cheyenne and Arapahoe Indians began raiding isolated ranches, running off horses, and antagonizing detachments of cavalry primed for action after a long winter. A Cheyenne party attacked and burned the Iron Spring stage station along the Santa Fe Trail, and, in June, the brutally murdered the Hungate family on their ranch thirty miles from Denver. Reprisals by the military led to a series of events that culminated in the Sand Creek Massacre on 29 November 1864. Cheyenne came to Sand Creek to witness the aftermath of the massacre. Incited by what they saw, the Cheyenne joined by Arapaho and Sioux gathered a force of thousands in early 1865, and initiated two attacks on the freight station of Julesburg killing forty whites, and blockading Denver. William Bent associated through marriage with a

Cheyenne woman and his trade relationship with the Cheyenne from the 1830s – 1840s, helped open negotiations for a new treaty in late 1865. However, intensive raiding of settlers continued into 1867. A major military campaign occurred in the winter of 1868-1869, resulting in the Treaty of Medicine Lodge, where most of the Southern Cheyenne and Arapaho agreed to relocate to a reservation in Oklahoma.

**Colorado Territory:** The formation of the Colorado Territory coincided with the onset of the Civil War in 1861. Geographically the newly established territory included portions of western Kansas and Nebraska, eastern Utah, and northern New Mexico. However, due to political infighting, the prospect of attaining actual statehood was less and less attractive to many Coloradans. From 1868 to the approach of the presidential election of 1876, Colorado statehood was a dead issue. Then, with the national elections fast approaching, President Grant promised Colorado statehood in return for three Republican electoral votes. The proclamation was issued on August 1, 1876, and that fall Hayes defeated Tilden by a one-vote margin.

By 1860, the population of Colorado had expanded to almost 35,000, with 82.4% of the working force employed in mineral extraction. The first detailed census (1860) for the Fort Carson vicinity reported 737 individuals living within the area of Canon City, down the north side of Fountain Creek, and up Fountain Creek to Colorado City. Demographics of this population consist of 614 men, 122 females, and one Negro. The Colorado Territory gold rush was short lived with the primary gold deposits in the Leadville district depleted by 1863, and the mining industry entered a depressed phase lasting through the 1860s. By the 1870s, the work force employed in the mining industry had dropped to 12.5%, a dramatic change from the 82.4% indicated in the 1860s census. Most prospectors eventually left, some turned to agriculture, and some stayed on to bolster new communities such as Boulder, Central City, and Fort Collins. With new mining discoveries in the 1870s and development of railroad transportation Denver effectively doubled its size by 1872; by 1874 Denver's population reached 20,000.

**Settlement and Development of the Fort Carson Area:** Fort Carson does not include locations of known outstanding events in the history of the region or the nation, but areas within and adjacent to the military reservation are directly associated with important historical themes and eras. Principal historical themes are homestead/ranch settlement and hardrock mining, but the area has also seen Spanish military and trading expeditions, placer gold prospecting, exploration expedition, overland emigration, United States military expeditions of the Mexican, Civil, and Indian wars, open range ranching and trail herding, railroad construction, and stagecoach communications. The following overview is intended to be a general background statement about the themes, events and eras of the Fort Carson region, with specific references to threshold events of themes and eras and to events within or adjacent to Fort Carson associated with the themes. Of no less importance is the direct association of Fort Carson Military Reservation itself with the United States' role in World War II as well as its association with the Korean and Vietnam wars.

The overview necessarily addresses a broad regional context, as well as the more particular context of the present Fort Carson Military Reservation. The regional context is part of southeastern Colorado bounded on the south by the Arkansas River, on the east by the Kansas-Colorado border, on the north by the headwaters of the Platte River system, and on the west by the Front Range of the Rocky Mountains.

Historic sites predating the 1860s have not been located within Fort Carson proper. The climate in the Fort Carson area is semiarid to arid and unsuitable for settlement on the subsistence scale. Settlement within the present boundaries of Fort Carson was sparse due to the lack of water and the difficulty of travel. The area surrounding Fort Carson would greatly expand as a

result of gold rush of 1859, bringing with it population and economic fluctuations, and as readily assessable minerals were depleted, resulted in a substantial decline in settlement of the area. The demand for fresh meat in mining camps played a role in the development of the Colorado cattle industry. The cattle industry developed gradually in the Fort Carson area beginning in 1860. The Civil War, depletion of readily accessible minerals, the difficulty in transportation and the transportation of goods, and growing conflicts between settlers and native tribes tempered growth between the mid-to late-1860s. With the cessation of Indian hostilities in 1868, development of better transportation alternatives and communication mechanisms, settlement gradually increased within the region surrounding Fort Carson and within its boundaries. Resurgence in population and community development resulted from the mining industry in Leadville in the 1870s and discovery of large gold deposits in Cripple Creek in the 1890s.

The discovery of gold in 1858 in the mountains near present day Denver and in Leadville (1859) would bring approximately 100,000 gold-seekers to Colorado in 1859, where they spread like wild fire up the South Platte into the upper reaches of the Arkansas River drainage to pan for gold. Not all emigrants came to seek fortune by panning for gold, but rather they took advantage of the needs of those who did. Thousands of would-be miners eventually stayed and became ranchers and farmers. Towns and villages emerged out of the wilderness in the late 1850s. A few communities developed to serve as supply points and agricultural centers near the present boundaries of Fort Carson: Fountain City (Pueblo), Canon City, El Dorado, and Colorado City. Canon City and Colorado City were located along the foot of the mountains on trails that lead to the gold mines in South Park and along the Blue River. Attributes of these two cities—the scenery, fresh mountain air, and fertile soil near streams—made settling in the area favorable. Regional farms could supply fresher food for mining towns than supply trains departing from the Missouri River. Thus, farms sprung up along the branches of the Arkansas, especially in Huerfano and Fountain Creek, offering fresh radishes, lettuce, onions, and peas for sale in the Denver market.

Colorado City received its name because it was located along the natural gateway leading to upper branches of the Colorado River. By 1860, the population of Colorado City had reached 1,000; many were merchants and forwarders (Griswold 1958). In a marketing campaign in May 1860, Colorado City advertised free access to the South Park Mines, abundant agricultural resources, medicinal springs, and inspiring views of the Garden of the Gods. From 1861 to 1862, Colorado City briefly held the distinction as capitol of the Colorado Territory. The first publication of the Canon City newspaper on September 8, 1860, included references to an operating shingle mill and steam saw mill, discovery of an oil spring, and announced that subscriptions were being taken up to begin a new church. By November, the population was 800, with forty businesses established. The growth of Colorado City and Canon City would go through a period of decline as the mining industry entered a depressed phase in 1863. By the end of the decade, Colorado City was virtually deserted.

The cattle industry in Colorado Territory developed as a direct result of the 1859 gold rush. Prior to the gold rush, ranches were located at widely scattered locations in the Arkansas River Valley, most close to the Santa Fe Trail. Former New Mexico citizens who trailed cattle herds northward in search of grassy pastures along major rivers operated many of the ranches. Cattle were brought in from Missouri or Kansas, rather than from Texas or New Mexico. In 1860, the cattle industry found its official beginnings in Colorado when the Lovell and Reed Cattle Company brought Texas longhorn cattle to the lower Turkey Creek area near Pueblo. Over the summer, cattle grazed, until sold in small packs to resident ranchers or for butchering. Many small ranches, established as early as 1860, continued to grow, and their success encouraged the establishment of others between 1869 and 1872. The home ranch or ranch headquarters

often was located on a stream with at least semi-permanent water, and the cattle would graze the adjacent public domain land.

True to the old pattern, most ranches continued to be located close to established trails. Settlement near present day Fort Carson began in 1860. The first settlement along Fountain Creek started when J.P. Robinson, Johnson Sanders, and Oliver Locks brought their families to the area and established small ranches. Several families, along with J.B. Bates, settled along Monument Creek, northeast of present day Fort Carson. Lewis Conley operated a gristmill on lower Beaver Creek, southwest of Fort Carson. William T. Holt established a cattle and sheep ranch on Horse Creek, east of Fort Carson, where he eventually ran 1,200 cattle, 1,000 horses, and 125,000 sheep. D. M. Holden settled with his family in the Bijou Basin east of present-day Colorado Springs. By 1878, the Holden ranch was running 2,700 sheep and 1,500 cattle. Sparseness of water and lack of transportation routes would delay settlement within the Fort Carson area until the late 1860s.

Agricultural settlement in the area between Fountain Creek and Beaver Creek was limited almost entirely to raising stock because of the rough and arid landscape and the lack of surface water. The term "settlement" does not accurately apply to occupation and use of the area until at least 1880. Scattered and usually isolated ranches were established throughout the Fort Carson area in the early 1870s, but most of the southern and eastern portions of the area were hinterland ranges for ranches headquartered along Fountain, Beaver, Red and lower Turkey Creeks. Virtually all of the territory remained unfenced range, and therefore used as common range by the ranchers.

Just outside the boundaries of Fort Carson, J.L. White and H.S. Clark secured CE patents in 1868. C.B. Wells (1867), P.D. Miller (1868), and J.W. Love (1869) held land patents located within the first terrace of the Fountain Creek flood plain. By 1872, ranches were located along the length of Turkey Creek. In the 1870s, sheep were a dominant livestock in the area. One of the earliest and most successful sheep ranchers within the Fort Carson area was David Degraff who settled near Fountain Creek in 1871. Reported to have run about 6,000 sheep at one time, Degraff switched to raising shorthorn cattle in 1887. The Skinner and Tabor Ranch started a sheep operation in 1878, with its headquarters at the Skinner railroad siding just northeast of Fort Carson. W.A. Cuthell operated a large sheep ranch in 1878 near Cheyenne Valley, located in the original Fort Carson cantonment area. W.D. Corley purchased the ranch and operated as a Hereford cattle ranch until purchased by the Army.

The Charter Oak Ranch/Brown Ranch operated in the general vicinity of the present Fort Carson Rod and Gun Club. Charter Oak ranch was founded prior to 1886 with the original name of Brown Ranch. C.S. Haynes, owner of the Haynes Cattle Company, changed the name to Charter Oak. Haynes filed a land entry in Sec. 10, T16S/R66W in 1885, later canceled. The Mary Helen Ranch, named by owner Charles Carson in the 1930s, was from part of the Old Charter Oak property. Latter the Engle Land and Cattle Company owned the ranch. Both ranches produced Hereford Cattle.

In 1866, Charles Goodnight and Oliver Loving established the Goodnight-Loving Trail, to bring cheap Texas beef to the mining camps of the Front Range. The trail extended from the Pecos River in Texas to Trinidad, Pueblo, Colorado City, and Denver. Goodnight and Loving brought 2,000 Texas longhorns into Colorado in 1867, and started a ranch on Apishapa Creek. Colorado's cattle industry was growing, with an estimated 147,000 cattle in 1867. As early as 1868, El Paso County stockgrowers held meetings to discuss concerns that Texas cattle traveling through the region could transport tick fever and other diseases that would endanger

Colorado herds, and possibly affect the efforts of selective breeding to improve range stock. Petitions passed against the importation of Texas cattle, and armed men soon turned back Texas herds entering the Colorado Range, causing the search for ranges and slaughterhouses further north that welcomed Texas longhorns.

The route of trail drives probably changed somewhat depending upon the time of year and condition of the grass and streams. Some Texas herds possibly trailed through Fountain Creek on a trail reportedly used in the 1870s and 1880s until fencing and railroad construction made the overland cattle drive unprofitable and unnecessary. After the Union Pacific Railroad was built through Wyoming in 1868-1869 a vast opportunity for ranching opened up on the Central and Northern Plains, and primary cattle drives moved eastward away from the Fort Carson area.

Attack by Indians was not the only violence settlers and ranchers faced in eking out a living on the frontier. The Arkansas Valley Claim Club was organized by ranchers in 1860 “to protect life and property”, and to arbitrate range rights. In April 1863, a band of horse rustlers disturbing the peace in the southeastern section of the newly formed Colorado territory, were stopped by a shoot-out near an outcrop called “Crows Roost” on Squirrel Creek, east of Fort Carson. That same year, the Espinosa brothers, Vivian and Filipe, committed a series of robberies and murders in a rampage leading from Hardscrabble Creek to South Park, then southward to the Fort Garland area. Near upper Beaver Creek, the brothers killed Henry Harkings on March 19, 1863. Harkings was buried in Deadman Canyon, outside the present northwest boundary of Fort Carson.

In the spring of 1876 most of the cattlemen on Turkey Creek, Red Creek, and Little Fountain Creek formed the Turkey Creek Stock Association in order to handle their stock more effectively and economically. The constitution of the Association required ranchers to contribute one herder for each six hundred head of cattle on the range and to pay assessments for the cost of roundup proportional to the number of cattle. During the first summer, the Association herders spent about five months on a roundup that apparently extended from the Arkansas River northward to the Arkansas-South Platte divide. The *Pueblo Chieftain* (November 7, 1877) reported completion of the annual roundup. The principal beef sellers were J.W. Booth, Mrs. A.D. Hamlin, John Palmer, Rich Toof (whose home ranch was near the mouth of Beaver Creek), Ed Van Erder, Frank Price, Mr. Barnardsdale, Mr. Redman, and Jeff and Mass Steel. By 1878, the Turkey Creek Stock Association had 35 members whom cumulatively owned about 8,000 head of cattle. The roundup of that year consisted of fourteen herders under the direction of ranch foreman, John Palmer. Organized at the Steel Ranch on Fountain Creek the roundup took place on May 18.

In the fall of 1877, field cattle buyers began to visit the ranches of the study region to buy stock directly from the ranchers. Individual ranchers responded by rounding up their market-ready steers. The *Pueblo Chieftain* (November 25, 1877) reported that several ranchers were having a tough time extracting their stock from Wild Mountain, a densely wooded mountain between Beaver Creek and Red Creek. The newspaper reported in the same article that J.W. Booth, John Allen, Charles Hobson, and the Myers brothers sold steers to one of the buyers.

With the arrival of railroad service, ranchers shipped most of their stock by rail from Colorado Springs, Fountain, or Pueblo. However, the high cost of shipping led several members of the association to drive herds of cattle overland to Kansas City. The last trail drive from the Fort Carson area probably occurred in the early 1880s.

Stagecoach lines were one of the first modes of transportation to provide passenger and mail service to supply stations and gold camps. The Leavenworth and Pike's Peak Express Company, already operating under a federal contract to deliver supplies to army units in Utah Territory, provided daily passenger service between Kansas and the Cherry Creek settlements for a fare per person of \$100 to \$125 one way. In 1860, after reorganization, the name changed to the Central Overland, California and Pike's Peak Express Company (COC&PP), and besides running passenger service, the COC&PP also ran the Pony Express across western America until 1861. Ben Holladay's Overland Mail and Express Company took over the COC&PP in 1861, and the Wells, Fargo & Company took over the line five years later. Stagecoach and mail service between Denver and Santa Fe in the 1860s was irregular. The line apparently ran "...from Denver...through Russellville, Jimmy's Camp, the Fountaine and Jenk's Ranch; then" left "over the hill to the Arkansas near the mouth of the Huerfano...".

Several stage stations were located near the eastern boundary of Fort Carson. The Widefield Stage Station was about two miles south of the present junction of Colorado Highway 83 and U.S. 85. The Fountain Stage Station was on the southern edge of the present city limits of Fountain, on the north bank of Jimmy Camp Creek. The Little Buttes Stage Station was in Section 33, T16S/R65W, at a ranch operated by Mr. Lincoln and Mathias Lock. A "Map of the Colorado Territory Embracing the Central Gold Region" (1886) shows a community/stage station (?) of El Paso, perhaps three miles north of the Pueblo-El Paso County boundary. The map locates Wood Valley about four miles south of the boundary. Piñon possibly had a stage station on the west bank of Fountain Creek in Section 31, T18S/R65W, and east of the southeast corner of Fort Carson.

Congress appropriated \$1 million to subsidize daily transcontinental mail service, either by main line or extension routes in 1861. Denver was interested in establishing a direct east-west route, but after investigation development of a pass over the mountains proved too difficult to maneuver. Daily service to the gold camps came by way of a tri-weekly branch from Julesburg, off the Oregon Trail. Weibling received a mail contract in 1862 to provide regular mail service from Denver to Pueblo. Jacobs took over the mail contract and extended the service to Trinidad. The Barlow, Sanderson and Company established a stage line in 1861 from Independence, Missouri to Santa Fe, and took over the Jacobs' line, known as the Denver & Santa Fe Stage Line in 1869. A branch telegraph line extended from Julesburg to Denver in 1863. By 1868, the telegraph line ran from Denver to Santa Fe by way of Colorado City, Pueblo, and Trinidad. Colorado Territory would not gain transportation service by rail until 1870.

In the 1870s, sporadic new gold and silver strikes were discovered in the mountains west of the region nearest the Fort Carson area. The Union Pacific Railroad completed its mainline through Cheyenne, Wyoming in 1868, and the transcontinental link by 1869. When Coloradans learned the Union Pacific would not be extending a line to Denver, citizens with financial backing built the Denver Pacific Railroad in 1870, with a line extending from Denver to Cheyenne, where it connected with the transcontinental line of the Union Pacific. The Kansas Pacific Railroad completed its line from St. Louis to Denver that same year. As these two railroad lines reached completion, W.A.H. Loveland began building the Colorado Central Railroad, which extended out of Denver to Golden and on to the mines on Clear Creek. By 1871, the Denver and Rio Grande Railroad (DRG), directed by General William Palmer, began building a line southward, reaching Colorado Springs on October 21, 1871. The DRG extended its line south, east of Fountain Creek reaching Pueblo on June 15, 1872, eliminating the stage line along that route. The Canon City Railroad, a line financed by the DRG to gain access to the coal fields, extended up the Arkansas River to Coal Creek, several miles east of Canon City.



The growing industry at Cañon City, the failure of railroads to reach Cañon City until 1877, and the settlement along Beaver Creek resulted in a demand for overland passenger and freight service between Colorado Springs and Cañon City. When the railroad did not provide service to Canon City in the early 1870s, Bob Spotswood and William McClelland constructed a wagon road in 1873 from Beaver Creek northward to Colorado Springs, over much of the route later known as Lytle Road. The Granite-Colorado City Stage began carrying passengers and freight over the road. One source reported that at least one hundred people used this route per day. The exact route of the stageline/wagon road is not known, but it probably conformed in large measure to a road or trail shown on an 1862 map of Colorado territory. As in many other cases, the stage service was probably preceded for some time by mounted mail service on the route. Two sub-post offices were set up along the route. Sun View, the home of Bob Womack on the Little Fountain served as one sub-post office, and the other at the John Lytle homestead on Turkey Creek. Thus the area took on another title of recognition as "the Lytle" area (*Cañon City Daily Record* May 8, 1962).

Other archival sources identify two stage stations farther to the southwest on Beaver Creek. The little community of Hatten, also called Upper Beaver Creek, was served at an unknown date and for an unknown period. Hatten area settlers grew vegetables and fruit for the mining camps and began providing cheaper imported foodstuffs. Farther south, near the confluence of Red Creek and Beaver Creek, the community of Glendale was established about 1873 as a station on the stage line. John McClure, a merchant in Cañon City, built a large hotel "of pale stone from near-by quarries" on the east bank of Beaver Creek, above the junction with Red Creek, called the McClure House. Large barns and corrals that held a thousand mules and horses for exchange teams were located below the hotel where the road forded the creek. During the years when mining along the Upper Arkansas brought an enormous amount of traffic through the area, D. S. Coffman, then proprietor of the hotel served more than a hundred passengers a day. In addition, "the spacious, well-furnished rooms made it a popular spot for local weddings, dances, and occasional gospel meetings. It was frequented by Indians and Cowhands as well as more cultured ladies" (Fremont County historian Rosemae Campbell 1972). Campbell may have exaggerated the importance and the business of the stage stop to a considerable extent.

Glendale remained a bustling stage station and settlement center until railroads reached Leadville and removed both the need for transportation to the Upper Arkansas from Colorado Springs and some of the market for agricultural products grown around Glendale. The stagecoach was discontinued in the late 1870s; archival sources give the date of demise of the community as 1896 and 1909. A flood on June 5, 1921 destroyed everything at Glendale except the stone hotel. Glendale was apparently located in Section 35, T18S/R68W, about a half-mile to the west of the Fort Carson Military Reservation. Hatten was well outside the reservation boundary.

In 1876, the Atchison, Topeka, and Santa Fe Railroad (ATSF) completed a line up the Arkansas River to Pueblo eliminating the need for the Southern Overland Stage. In response to the ATSF, the Denver and Rio Grande Western Railroad (D&RGW) extended its track from Pueblo south to the Purgatoire River. By 1878, the two companies were in competition for access to Raton Pass. "Uncle Dick" Wooten disliked the D&RGW, which worked favorably for the ATSF to received access in 1878 to Raton Pass via Wooten's former toll route. The ATSF reached Trinidad on September 1, 1878. The Pueblo and Arkansas Valley Railroad, a subsidiary of ATSF, built a track between Granada and Pueblo in 1877, and continued construction to Cañon City and the Royal Gorge, and the 1873 the Granite-Colorado City Stage route was abandoned shortly thereafter.

Additional rail access to the Fort Carson area was established when the Denver and New Orleans Railroad (know later as the Denver, Texas and Fort Worth Railroad, a subsidiary of the

Chicago, Burlington, and Quincy) built a line from Denver to Trinidad in 1881. The Missouri Pacific reached Pueblo from the east in 1887. That same year the ATSF built a line from Pueblo to Denver by way of Colorado Springs. The last major rail link to the region occurred in 1888 when the Chicago, Rock Island, and Pacific Railroad reached Colorado Springs via Limon.

During the late nineteenth century Euroamerican interests came to control and dominate southeast Colorado. Several factors contributed to the intensive settlement of the plains in the area by the early twentieth century, including the passage of the Enlarged Homestead Act of 1909 and the Stock Raising Act of 1916. Methods of dryland farming also improved, and new wheat strains better adapted to arid environments were introduced. World War I was a major factor in the spread of dryland agriculture in the region, as the United States became an important exporter of wheat and corn to Europe. This period resulted in significant changes for southeastern Colorado, rivaling the gold rush era in terms of demographic effects.

Rail connections, coal, oil, and available water greatly influenced the growth of Pueblo and Florence. The discovery of oil, sometime in 1859 or 1860, became the lifeblood of Florence and Canon City where several small extraction and refining enterprises operated. Florence Well Field, established in 1881 with the development of the first deep well, holds the distinction as the second oldest oil field in the United States. In 1885, Florence opened a refinery with the capacity to refine 100 barrels daily, and other refineries were built. The Florence Well Field reached a peak in crude oil production in 1892, with 824,000 barrels extracted. By 1892 there were 75 producing wells, but gradually production declined and new exploration was halted by 1923.

Major ore milling and smelting industries developed in Pueblo and Florence. Pueblo built the first smelting industry in 1878 and was devoted to extracting gold and silver. Large deposits of iron ore discovered at Orient and Calumet in 1880-1881, and ore hauled from many sources in Colorado, resulted in the founding of the Colorado Coal and Iron Company in Pueblo. Six smelting furnaces, each with the capacity of 40 tons were operating by 1881. Meyer Gugenheim and his sons built the Philadelphia Smelter in Pueblo in 1888, one of the smelting bases that would contribute to the eventual world domination of the smelting industry by the Gugenheims. Three railroads built from the plains into the mountains included lines from Colorado Springs to Florence. The Florence and Cripple Creek Railroad built in 1894 brought low-grade ores directly to the reduction mills, causing Florence to develop into a milling and smelting center in its own right. When in 1901 the Colorado Springs and Cripple Creek District Railroad, the "short line", reached the mines, Florence gradually declined as a reduction center. The last mill closed in 1910.

The railroad stimulated the growth in the Pike's Peak Region and in areas on the Front Range. The mining industry in the 1870s also significantly affected the area surrounding Fort Carson, resulting in the establishment of several towns and rural railroad stations. Colorado Springs, originally Fountain Colony, established by General William Jackson Palmer in 1871 near the nearly abandoned town of Colorado City, was located on the new Denver and Rio Grande Western route from Denver to Pueblo. By 1879, the population of Colorado Springs had grown to about 5,000 people, and included members of Fountain Colony, a Quaker agricultural colony within the environs of the township. Recreation and tourism greatly influenced the early development of Colorado Springs, however the 1890 gold strikes in Cripple Creek expanded economic and societal development as it became an important ore-smelting center.

When the Denver and Rio Grande Railroad built its mainline south of Colorado Springs through the mouth of Jimmy Camp Creek in 1872, the town/siding of Fountain was probably established.

Various sources seem to confuse the Fountain community with Fountain City, a precursor to Pueblo established in 1859, and Fountain Colony at Colorado Springs. Early settlement around Fountain relied on irrigation, and the community became a farming and stock shipping center. In 1888, the town had a population of around 200 persons, but in that year a runaway train struck rail cars filled with naphtha and blasting powder in the Fountain switchyard destroying most of the town. The town was rebuilt and remains a small farming center. Other towns established along the railroad included Kelker, Wideland, and Wigwam.

Robert Womack's famous gold strike in 1890 resulted in a second Pikes Peak gold rush. By 1900, more than 450 mines developed yielding an estimated \$125,000,000 in gold extracted. The Cripple Creek Mining District is listed on the National Register. Gold strikes at Cripple Creek encouraged prospectors to examine streams of the Fort Carson area. During the 1890s, local farmers and ranchers joined prospectors mining for gold in Beaver Creek. Placer workings on Red Creek and Turkey Creek were extensive enough to encourage William A. Williamson to plat the town of Red Creek, near the head of Red Creek in 1893. The first day of the sale, June 22, 1893, fifteen lots sold, with arrangements to construct a two-story hotel made a week later. Settlement at Red Creek, directly west of the present Camp Red Devil, appears to have been temporary at best. Several claims established between 1916 and 1919 were located about a mile from Turkey Creek, west of Fort Carson. Occasional prospecting on Turkey Creek may have continued until Fort Carson was established.

Beginning in the late 1860s, as manufacturing, commercial and governmental structures established in developing towns, so did the desire for substantial buildings to house these enterprises. Stone and brick, to face prominent buildings, came into demand. In the early 1870s, the Denver and Rio Grande Railroad extended a line from Pueblo to the mountains, offering a way to ship stone from quarries established between Pueblo and Beaver Creek to Denver. Pueblo developed into an ore-smelting center in the late 1870s, leading to the successful development of the iron and the steel industry. By 1874, Denver and Pueblo were vying for the distinction of being the state capital, with Denver winning the title in 1881. In 1881, the firm of Mather and Geist built eight new calcine furnaces and four new blast furnaces in Pueblo. The Standard Fire and Brick Company of Pueblo organized in 1890, and by 1901 occupied a 21-acre track of land west of Fountain Creek. The plant employed 650 workers, and in a 24-hour day production capabilities numbered nearly one-quarter of a million bricks, consisting of 75,000 firebricks, 75,000 paving bricks, and 50,000 pressed bricks. By the turn of the century, Pueblo was reducing ore from areas outside Colorado, to include Arizona, New Mexico, Mexico, Montana, and Utah and shipping products to St. Louis, Chicago, and Pittsburg. The steel industry employed 3,000 workers, and produced steel for markets ranging from California to Missouri.

Large-scale, sustained quarrying and other extraction developed in 1898 when the Colorado Portland Cement Company began mining and manufacturing cement, 23 miles west of Pueblo on the Arkansas River. The towns of Portland and Cement developed. By 1908, the Colorado Portland Cement Company joined operations with an affiliated firm, the Portland Company. After 1910, the Ideal Cement Company built a ten-million-dollar cement plant at Portland. From 1915 to 1927, the Ideal Cement Company ran a small railroad from Portland about twenty miles northeastward to a limestone quarry on Beaver Creek.

In the early 1900s, Robert K. Potter, owner of a lumber business in Cripple Creek in the 1890s, became interested in quarrying building stone deposits in the Turkey Creek region of Booth Gulch. His ranch was located just south of the area that developed into the small stone quarrying and clay mining town of Stone City (1912) eventually purchased by Fort Carson in the 1960s. Porter established quarries in Booth Gulch in 1908. Clay mining had already begun in Booth Gulch in

1906, when J. Wands, owner of the Pueblo Clay Products Company, developed three clay mines to extract exposed Red Creek anticline clay deposits. Nevertheless, Potter was instrumental in establishing a railroad line into the area. Prior to the development of the rail line, wagons hauled stone to Pueblo.

Development of stone and clay industries at Booth Gulch remained limited by distance and difficulty of transporting materials to Pueblo. In 1908, the Kansas-Colorado Railway planned to build an electric railway line from Cañon City to Dodge City, Kansas, with a 25-mile extension from northwest Pueblo to the Turkey Creek region. R. K. Potter, owner of the Turkey Creek Stone Company, and a principle supporter of the plan, held groundbreaking ceremonies on his Turkey Creek Ranch on July 31, 1908 (*Pueblo Chieftain*, July 31, 1908). Management problems and financial setbacks prevented construction of the line, until the company reorganized in 1910, and constructed 21 miles of railroad grade from Pueblo to Booth Gulch. An ambitious plan was to extend the railroad a few miles east of Turkey Creek following Lytle Road to the north, eventually ending in Cripple Creek. Only limited grading had begun on this segment and discontinued in favor of a route that afforded better grades and a more adequate water supply for the locomotives. Additional financial difficulties sent the railroad into receivership until reorganization in April 1911 as the Colorado Kansas Railway. Construction of the Pueblo/Booth Gulch railroad resumed with 14.8 miles of rail completed by the end of the year. By late May/early June 1912, with the addition of eight miles of rail following the west bank of Turkey Creek, the goal to provide rail service to the Booth Gulch quarries had been reached. The Booth Gulch line was 22.2 miles long and had 1.8 miles of sidings. An estimated five hundred Pueblo residents boarded inaugural excursion trains on June 12, 1912, to travel to the mining area (*Pueblo Chieftain*, June 13, 1912).

Several large quarries opened after the railroad reached the area. A quarry about three miles from the nominal rail terminus at Stone City produced a fine white sandstone which was used to build the massive Pueblo County courthouse in 1918. Adjacent to the quarry was a large stone working yard with a railroad track running through it. A large overhead crane was used to move blocks of stone to a finishing plant and then to flatbed railroad cars for shipment. McKenzie's description, confirmed by archaeological survey, indicates that this quarry complex was to the southeast of Stone City, and portions of a spur rail grade are visible, which served various quarries in that area. Builders began switching to reinforced concrete as a major building material after World War I, to the detriment of the natural stone industry. The Turkey Creek Stone, Clay & Gypsum Company ceased quarrying sandstone at its large pit in 1930, but the company maintained an office in Stone City and probably continued to mine other products through 1934.

The Colorado Kansas Railway consistently operated at a loss; in 1930, it went into receivership. The line sold under foreclosure in 1932 and a corporation called the Colorado Railroad purchased it in 1938. Throughout its existence, the line operated with second-hand equipment; in 1917, the rolling stock consisted of one 30-year-old locomotive, one passenger car, ten flatcars, and one service car. When the original locomotive was no longer operable in 1938, a locomotive leased from the Denver and Rio Grande Western Railroad replaced it. The leased locomotive proved too heavy for the deteriorated condition of the grade and track, and in 1940, replaced with a gasoline-electric locomotive. The line continued to operate, usually at a loss, until 1957 when a flash flood washed out several bridges on the line. The management of the Colorado Railroad then determined that the haulage potential of the line was not sufficient to justify repair of the bridges and grade, and the tracks removed in 1958.

Clay mining proved to be a much more durable industry at Booth Gulch than was quarrying of building stone. The primary means of mining clay was driving drift tunnels into the slopes and

excavating the clay seams found between solid sandstone and limestone roofs and floors. In later years, the mining of clay evolved in Stone City with the quarrying of limestone and sandstone as seams of clay were exposed. Accounts of pre-1912 mining are lacking, but it is likely wagons carried the clay to Pueblo for processing and firing. The *Pueblo Chieftain* reported in June 1912 that a large brick plant would be installed to kiln the eight kinds of clay being mined. This brick plant was probably built; a brick manufacturer, J. E. McCusker, was listed as a resident of the town in 1913 and 1914. However, a brickyard also was operated in Pueblo in association with the Booth Gulch mines, and no archaeological evidence of a brick plant at Stone City has been found. The Booth Gulch clay deposits were first mined by Wands' Colorado Clay Company and the Turkey Creek Stone, Clay & Gypsum Company. Other companies that also mined these deposits in were the Pueblo Quarries Incorporated, the Standard Fire Brick Company, and the Diamond Fire Brick Company.

Archival sources do not indicate that clay mining was done anywhere other than at Stone City. A number of materials mined in Stone City were gannister (a pure form of silica), limestone, flint fire clay, sandstone, plastic clay, calcite, roof tile clay, vitrifying clay, gypsum, glass sand, and gypsite. Calcine kilns, which heated raw materials to make them friable and pure of unwanted organic material, operated at Stone City at least from 1924 to 1930, with H.R. Colby serving as superintendent. Pueblo Clay Products Company built and operated the calcine kilns, and possibly promoted Colby to general manager of the firm's Stone City complex. In 1930 or 1931, Colby became manager of the Pueblo Clay Products Company, presumably in Pueblo, and thereafter the manager of the calcine kilns no longer appears in the business directories. Very limited, part-year mining of clay in the area, by the Colorado Clay Company, continues to the present day. Clay is now hauled by truck.

Mining is represented at Fort Carson by one recorded site, Stone City, located within and at the extreme southern end of the reservation in the vicinity of lower Booth Gulch and the southernmost reaches of Booth Mountain. The site was heavily impacted by intentional demolition by the Army and impacted further during training exercises. In 1988 and 1989 the site of Stone City and associated industrial complex was extensively documented using a combination of aerial photography and photogrammetric mapping, surface inventory and recording, and archival research. In addition to Stone City, the study area encompassed two previously recorded sites and one newly recorded site. Ultimately, 123 features were recorded and include quarries and related features, mines and related features, railroad grade and associated features, residences, and miscellaneous features. Two of the features, a calcine kiln and culvert, were assessed as NRHP-eligible. The largely intact calcine kiln dates to the earlier years of quarrying in the Stone City area, as does one of nine culverts associated with the Colorado-Kansas Railroad bed or related rail spurs. Spanning an ephemeral drainage above Stone City proper, the culvert exhibits a vaulted configuration and is constructed of mortared sandstone blocks.

The vitality of the small community of Stone City was entirely tied to the fortunes of the nearby mines. The Turkey Creek Stone, Clay & Gypsum Company filed the official plat of Stone City on December 24, 1912. The town was located in the W1/2 of the E1/2 of the SW1/4, Section 26, T18S/R67W. It consisted of five blocks of 34 lots each and one block containing 17 lots; each lot was 25 by 120 feet. The original plat indicated that portions of four blocks would be included in the right-of-way of the Colorado-Kansas Railway. Four of the five avenues and one of the two streets on the plat were named after officials of the Turkey Creek Stone, Clay & Gypsum Company: McCorkle, Potter, Crews, Harvey, and Candow. West Street and Hillside Avenue were geographical truths. An addition to the plat, of unknown date, indicates a "Water Main" extending along the east edge of the north half of the town and ending in a "City Water Supply."

As may be expected, the commercial focus of the town was the railroad depot, which was a small wood frame structure with a gabled roof and a simple board platform facing the tracks to the north. The depot also housed the general merchandise store operated by J. W. Heath from 1912 to 1915. The depot building eventually moved to Penrose presently stands at the corner of Broadway and Grand. C. M. Jasper and Mrs. E. V. Jasper operated a general merchandise store from 1916 to 1921, followed by Roscoe E. Sutton in 1923, J. O. Southwell in 1924, and L. B. Keigley from 1925 to 1937. By 1939, Clyde Wands sold groceries in association with his auto service station. In 1950, James W. Mayfield operated the Stone City Grocery. The locations of the grocery/general stores are not known; the store may have remained in the depot for sometime after 1915.

The post office, established at Stone City in 1912, was usually associated with the grocery or general stores. In 1920 through 1921, Mrs. William Candow ran a large hotel, built in 1920, followed by Dumbeck & Dodge in 1922. After 1922, the hotel listing disappears from the business directories. One source indicated the building was dismantled and the stone was used in construction of a building in Pueblo. For varying lengths of time, the town also had resident blacksmiths, an automobile stage to Pueblo, a chiropractor, a constable and justice of the peace, and two ranch owners. A resident principal served a combined grade and high school at least as early as 1922. The school building burned in December of 1939 and was replaced with a two-room school built as a Works Progress Administration project in the summer of 1940.

The population of Stone City appears to have been rather static; an estimated 100 persons lived there in 1912, 100 in 1914, 150 in 1917, 175 in 1929, 125 in 1935, and 100 in 1950. The post office was closed on June 30, 1957, serving only seven families with mailboxes at Stone City, and some boxes serving ranch families who did not live in the town. Photographs taken on an unknown date show small, one-and-a-half story wood frame cottages, surrounded by lawns and trees. Some persons may have continued to live in Stone City until the U. S. Army purchased the area in 1965 when the Fort Carson Military Reservation expanded. The Army subsequently bulldozed the Stone City structures and only the trees, foundation remnants of structures, and widely scattered refuse are now visible.

Other smaller stone quarries and clay mines are known to exist inside the Fort Carson Military Reservation. Records of mineral entries on public lands indicate that several claims were filed in the period 1915-1919 in areas removed from stream courses, which probably means the claims were filed to reserve mining rights to stone or clay. The historical and engineering significance of the small mines and prospects is probably much less than that of the Stone City complex.

Unlike other areas of the Plains, the Fort Carson area did not have distinct homestead settlement periods. Sizable ranches prior to the 1940s involved a combination of purchasing land claims and filing claims on available land. Generally, later homesteaders, often limited to marginal land, characteristically claimed land under laws requiring a period of residence and improvement. Between 1865 and 1965, 1,735 land entries were filed in the immediate Fort Carson area. The number of entries rose dramatically from the 1860s to the end of the 1880s. After a quieter decade of the 1890s, land entries jumped to a peak during 1900-1909. Homesteading remained strong in the 1910s and 1920s, with a large drop off in the 1930s.

Sixty percent of all land entries occurred between 1900 and 1929. This corresponds with the prime homestead period on the Plains when the government encouraged the establishment of family farms and dryland agriculture. Laws that encouraged dryland farming and the system's inappropriateness are demonstrated in the number of failing land entries. Of land claims filed in the 1870s, only 11 percent failed. Thereafter percentages rose with 15 percent in the 1880s, 25

percent in the 1890s, 42 percent in the 1900s, 68 percent in the 1910s, 40 percent in the 1920s, and 91 percent in the 1930s.

The period 1900 to 1920 was the prime homestead period for the dryland areas of the High Plains, and therefore a high number of land entries for the Fort Carson area are not surprising. The high volume of land entries in the 1920s, when climate and the economy of the region made any agricultural existence difficult, may be attributable to inertia from the preceding decades and/or attempts by previous claimants to obtain sufficient land to make a living. Despite the facts that the land was open for settlement in the 1860s and railroads penetrated the area in the 1870s, 60% of all land entries in the area were made between 1900 and 1929.

The inappropriateness of dryland farming and the laws, which encourage it, are demonstrated in the ratios of the number of land entries to the number of entries that failed to reach patent. Of land claims filed in the decade of the 1880s, 27% (3 of 11) failed to reach patent because the claims were canceled or relinquished. The number is not statistically reliable because of the small universe and because the actions of a single settler could determine the entire ratio. During the 1870s only 11% of land claims failed. Thereafter the ration of failures rose steadily: 15% in the 1880s, 24% in the 1890s, 42% in the 1900s, 68% in the 1910s, a mere 40% in the 1920s, and 91% in the 1930s.

Availability of water was a key factor in success of settlement. The first known irrigation system in the area was in place in 1863. A General Land Office survey plat (1863) shows "Murray, Cooper, Miller and Stubbs Ditch" east of Fountain Creek. About the same date Lincoln and Lock filed water right claims and began irrigating hay meadows near Fountain, and several settlers began irrigating fields on Beaver Creek near what later became Glendale. A number of applications were made for rights-of-way for irrigation ditches and reservoirs within the Fort Carson area in the period 1865 to 1965. Only one filing for a ditch appears in the Federal land records; it was entered in 1911 and relinquished in 1924. The ditch was planned to run through 23 legal sections. Considering the long period the rights were in force, this ditch undoubtedly served a number of settlers. One other ditch was filed with Pueblo County officials, rather than with the General Land Office. Oscar P. Harpel filed a plat for the Harpel Turkey Creek Ditch on December 26, 1895. Other small ditches may also have been filed with county officials.

Harpel filed rights to a reservoir in 1903, but the entry was canceled in 1910. Applications were also filed for reservoir sites in 1906, 1913 (proof of construction filed 1923), 1909 (relinquished 1929). The largest reservoir project was the construction of a dam on Turkey Creek, which resulted in the present Teller Reservoir. The General Land Office reserved the general site as a potential reservoir area in 1891, and in 1894 R. K. Potter and Red Rock Reservoir, Inc. filed an application for rights to build a reservoir in the same township. That claim was canceled in 1915.

In the meantime, much of the land came to private patent, which would not necessarily negate the rights of other persons to build and maintain a reservoir there. R. K. Potter and associated companies obtained special warranty deeds and other deeds for some of the property beginning in 1910. The progression of companies interested in the project appears to have been Turkey Creek Reservoir Company (1910), Turkey Creek Irrigation Company (1914), Meadow Investment Company (1921), Pueblo Meadow Land Company (1923), and Red Rock Reservoir, Inc. (1923). In 1924 Frederick J. Muench of Stone City filed a plat with the Pueblo County Clerk for the Hood Rock Reservoir. Muench's plan included two dams, one 90 feet high and one 20 feet high on Turkey Creek, and a diversion ditch below the second and lower dam. The development would also be known as the Turkey Creek Dam. Muench's project appears to

have been slightly south of the Red Rock Reservoir project. The present dam was apparently built shortly thereafter.

The ribbon of settlement on Beaver Creek began to expand onto the mesa to the west about 1900. In 1907 Florence merchant J. Q. MacDonald convinced Spencer Penrose and other Colorado Springs investors to develop large-scale fruit growing businesses on the mesa. The Beaver Creek Land and Irrigation Company bought out settlers on Beaver Creek to obtain water rights, and they build an extensive series of irrigation ditches to the west of Beaver Creek. The company platted Beaver Park agricultural subdivision on November 1, 1907, and in June of 1908 the Fremont Townsite Company superimposed the townsite of Penrose over parts of Beaver Park. To provide access and transportation to the 18,000-acre development, Penrose and other investors built the Beaver, Penrose and Northern Railroad in 1909. The line ran from Penrose Townsite to Beaver Station on the Denver and Rio Grande Railroad at the mouth of the Beaver Creek. The Beaver, Penrose and Northern ran only until 1919; in its last years it operated with a Cadillac flange-wheeled auto car as its locomotive power.

The introduction of refrigerated railroad cars after World War I caused a decline in the demand for Beaver Creek fruits. Heavy rains in the spring of 1921 caused the Shaeffer Dam on Beaver Creek to collapse; a wall of water sped down Beaver Creek and eventually down the Arkansas River to devastate the valley and a large area of Pueblo. The Shaeffer Dam was a chief source of irrigation water for Beaver Park, and in the following years the farmers turned to other kinds of produce. The Shaeffer Dam was rebuilt and other reservoirs were constructed, but the drought and economic difficulties of the Great Depression brought a general decline to the community. The Penrose Canning Factory and an alcohol distillery each lasted only two years in Penrose.

Very little information has been found about the architecture of the settlements in the Fort Carson area. The area had abundant sources of building stone and most foundations and retaining walls found in the area to date were constructed of mortared and dry-laid sandstone. Timber suitable for building purposes, particularly for cribbed log construction, generally did not exist in the area but was available to the west and north. Some of the larger structures built in the 1860s and 1870s probably were built of imported logs, and many of the smaller structures were undoubtedly built of native piñon pine and juniper logs. Remains of a log structure have been found in the southwestern part of the reservation. William Ninehouse, a settler on Beaver Creek, constructed his dwelling, barns, and granary by anchoring cedar poles in a vertical rock face, placing cedar poles as rafters, and then covering the roof with a poured concrete slab. Similar construction is indicated in the physical remains of another settlement site recorded on Fort Carson.

Piñon and juniper poles were also sunk vertically into the ground in close order to form corrals. The pole enclosures offered increased shelter to livestock, were cheap to build and did not cause injury to livestock as pole-and-wire fences often did. This kind of corral was particularly appropriate for horses and mules, which were prone to wire-related injuries. One such corral was built and used by a grading crew during construction of the railroad from Pueblo to Stone City in 1910. The "stockade" at the supposed Bent trading post on Turkey Creek may simply be a corral built after 1873.

By the early 1870s sawmills were producing milled lumber on upper Beaver Creek and in the area called "The Pinery" near Colorado Springs. Milled lumber could also be obtained at the railroad sidings along Fountain Creek on the east edge of the Fort Carson area. Most settlement structures were probably simple wood frame buildings, but some true sod, adobe brick, and mortared stone masonry buildings are known to have been constructed in the region



in the early settlement period. Mounding of clay material around some foundations in the Fort Carson Military Reservation indicates either that superstructures were partially composed of earthen materials (or insulated with stacked sod) or, more likely, the roofs were covered with earth or sod.

Ethnic reflections in settlement architecture are apparently rare in the region, other than the ephemeral association of adobe with Mexican Americans. Regional urban stylistic preferences during the period 1865 to 1920 tended toward "Western Victorian" forms and decorations, but rural structures in the region were characteristically utilitarian in design with little if any ornamentation. A notable exception to this pattern was Spencer Penrose's Turkey Creek Farm. Shortly after Penrose bought the farm in 1912, he hired the Colorado Springs firm of MacLaren & Thomas, Architects to design a showcase house, garage, stable, hay shed, and large cow barn to be built on the site. Several buildings already existed on the site at that time, and the new structures eclipsed the old buildings in size. The house was designed in Spanish Revival Style, as was Penrose's sprawling mansion called El Pomar in Colorado Springs. The house featured curved Baroque gables, round-arched windows and doors, columns, balustrades, and wrought iron railings. Like the mansion in town, the house looked out on wide lawns and fine shrubbery. The house still stands today.

The most famous ranch located within Fort Carson is the Turkey Creek Ranch. The ranch is eligible for inclusion as a historic district in the National Register of Historic Places because of its association with Spencer Penrose and the development of ranching in the area. Supposedly established in the late 19<sup>th</sup> century by Frank Cross, it seems as though Cross never owned the property. H.H. Jacobs started the ranch in 1883, followed by 10 other owners before Spencer Penrose bought the ranch in 1912. Penrose reregistered the property in 1916 as the Turkey Creek Farm. The ranch saw much development under Penrose with many structures that contribute to the historic district because of architectural significance. The U.S. Army purchased the ranch in 1965, and its use has changed over the years. Today it is the Turkey Creek Recreation Area.

Nearly all of the historic period sites recorded to date on Fort Carson are related to the settlement theme. Most of the sites consist of remains of stone or concrete foundations, depressions, and scatters of domestic and agricultural artifacts. One site contains portions of buildings probably moved from within Fort Carson to just west of the reservation boundary. All but a very few of the recorded settlement sites appear to have had stock raising as the primary economic base; the remainder appear to have had a partial fruit- raising economic base. Other features associated with settlement within the reservation are occasional graves, windmills, dams, irrigation ditches, stock watering tanks, artifact scatters, and rock faces with historic graffiti.

**Settlement and Development of the PCMS Area:** After the war with Mexico ended, several significant changes occurred within southern Colorado. The Tierra Amarilla, Conejos, Sangre de Cristo, and Luis Baca Grant No. 4 land grants were confirmed, recognizing the settler's legal title to these large land parcels. But several of the grants were reduced in size. This created open land for Anglo settlement into the area, but Mexican settlers remained abundant. The *pobladores* migrated into the San Luis Valley around 1849 and established San Luis and San Pedro, the first permanent agricultural settlements in Colorado.

Though most of the migrants into the upper Arkansas River basin were Hispanic pioneers, a few Euro-American settlers established residences. Early settlers included Uriel Higbee, James Gray, "Uncle Dick" Wooten, Joseph Doyle, and Charles Autobeas. Anglo-American and

Hispanic settlement in the area naturally caused tension between Native Americans and emigrants. On Christmas day, 1854, a combined Ute and Apache force attacked El Pueblo and massacred its occupants. In the area of the PCMS, Kiowas, Comanches, and Arapahos continued raiding along the Santa Fe Trail between 1846 and 1847.

The 1858 Colorado Gold Rush and the Homestead Act of 1862 lured merchants, miners, and settlers into the area. In an attempt to prevent further Indian hostilities and secure the region for settlement, several military posts were established. The first true military post in southern Colorado was established at the base of Mount Blanca in the San Luis Valley. Fort Massachusetts was in use between 1852 and 1858. It was abandoned and a new post, Fort Garland, was established closer to the trail across the mountain pass. Camp Fillmore and Fort Reynolds were other two small military on the Arkansas River that were used in the 1860s.

The Army established a military post along the bottomlands of the Arkansas River near Bents New Fort in the summer of 1860. Originally named Fort Wise after a Virginia Governor, it was renamed Fort Lyon in 1862. The site flooded in June 1867, and was then relocated about 30 miles upriver near present day Las Animas, Colorado. Cavalry and infantry units were stationed at the fort and charged with patrolling the Santa Fe Trail, escorting stage and mail coaches, and protecting settlers from Indian depredations.

Despite the military presence in the region, and the 1861 treaty of Fort Wise, Indians and settlers continued to clash. In 1864, Southern Cheyenne and Arapaho Indians attacked the Iron Springs Stage station on the Santa Fe Trail, and the Hungate family of Running Creek was killed by Arapahos. In retaliation, Colonel John M. Chivington led the Third Colorado Volunteers in an attack on a large camp of Cheyenne and Arapaho at Sand Creek in 1864. A major military campaign occurred in the winter of 1868-1869 that resulted in the relocation of most of the Southern Cheyenne and Arapaho to an Oklahoma reservation.

The *Supplement to the Official Records* provides details of additional military movements near or through the PCMS during the Civil War. In August 1862, 1<sup>st</sup> Colorado Cavalry and 2<sup>nd</sup> Colorado Volunteer Infantry were stationed at Pleasant Valley Camp, midway between Fort Lyon, Colorado and Fort Union, New Mexico, under orders to protect mail and wagon trains on the Mountain Branch of the Santa Fe Trail. Troops were again stationed at this post, later referred to as Gray's Ranch, the following two summers. The Hole in the Rock stage station on Timpas Creek was also utilized by military patrols. Barlow and Sanderson were awarded a mail contract in April 1866, and added new stations at Hole-in-the-Prairie and Hole-in-the-Rock, which are just outside the western PCMS boundary.

Troops stationed at Fort Lyon were involved with protecting the settlers from the Indians through the 1870s. In 1873, companies of the 6<sup>th</sup> Cavalry were sent to Nine Mile Bottom and Red Rocks to intercept Indians in those areas. In May 1874, H Co. 6<sup>th</sup> Cavalry established camp on the Purgatoire River midway between that post and the Raton mountains. Indian troubles flared across the plains in July of 1874, and herders were attacked in Bent Canyon. Cavalry stationed at Fort Lyon were dispatched in pursuit. Two 19<sup>th</sup> Infantry companies assigned to escort Cavalry horses to Trinidad left graffiti near Bent Canyon stage station.

In the late 1860's, the Pinon Canyon region went from being a nearly uninhabited region to a viable ranching community. Hispanic pioneers came north from New Mexico with their sheep and goats to found plazas along the Purgatory River and its drainages. As transportation to the area improved in the 1870s, with the service from the stage line and railroad, Anglo settlers increased and cattle were introduced.

The initial period of historic settlement in the PCMS area was characterized by Hispanic migration from New Mexico and Trinidad. The first account of settlement in the area was given by William Bell, a surveyor for the Kansas Pacific Railroad, who passed through the PCMS area in 1867. Bell observed an overgrown and abandoned Indian trail in the Purgatoire Canyon, some flocks of Mexican sheep and goats, and a herd of unattended cattle. Based on archeological observations, it is possible that many structures located in the side canyons on the PCMS were occupied during this period.

Shortly after Bell passed through the area, a Mr. Climer settled in the Red Rock Canyon area. He was followed by Juan B. Cordova and his family, who built a fortified dwelling of adobe and logs at the confluence of Chacuaco Creek and the Purgatoire River east of present-day PCMS. During the late 1860s and early 1870s, many individuals of Hispanic descent moved into the Red Rock/Bent Canyon area. They arrived in family groups or with other familiar individuals, which allowed them to organize close-knit communities for purposes of homesteading larger sections of land.

John W. Prowers had established the first of the large cattle operations in southern Colorado in 1861. His land extended from the Purgatoire River to the Kansas State line and was comprised of over 600 cows. In 1864, the Goodnight-Loving Trail was established and Texas longhorn cattle were passing through the region in large herds.

In the spring of 1871, Barlow & Sanderson's Southern Overland Mail & Express Company established a new route that left the Santa Fe Trail at Iron Spring and meandered southeast through Sheep Canyon to what would later be PCMS lands. The route crossed the head of Bent Canyon, and then proceeded west through Stage Canyon to upper Lockwood Canyon. From the Lockwood Canyon stage stop, the trail continued southwest across the prairie to the Hogback Stage Station (present day Brown's Sheep Camp), and then to Gray's Ranch and subsequently Trinidad.

A home station, providing meals and a change of horses, was opened at Bent Canyon in April 1871. The stage route was later moved closer to the Purgatoire as described in a June 1875 *Las Animas Leader* article which reported that the first stage station was at Alkali, 20 miles out from West Las Animas. Approximately a quarter of a mile beyond, the road then branched, and the left fork went to the Nine Mile Bottom, eventually passing through Fagin and Brown's sheep camp, otherwise known as Vogel station (approximately 11 miles from Alkali). From here, it was then 15 miles further to Bent Canyon station.

In the end, the stage line was short-lived. The *Las Animas Leader* (Aug 27, 1874) proclaimed the day that the Atchison, Topeka and Santa Fe (AT&SF) Railroad reached town. By the spring of 1876, the AT&SF had reached Pueblo, and the Denver & Rio Grande was providing service to Trinidad. The Southern Overland Mail and Express Company terminated service to settlers along the Purgatoire River on September 1, 1876.

In addition to settlement by Hispanics, Euro-Americans such as Isaac Van Bremer, Stephen Conroy, Eugene Roarke, Wilfred Rily, the Taylor brothers, and later S.T. Brown and E.S. Bell, settled in the PCMS area. Most early Hispanic and Euro-American settlers were engaged in sheep herding, although cattle ranching also took place.

The initial period of settlement in the PCMS area lasted until the late 1880s when most of the original landowners gave up their homesteads to emerging ranching interests. The open range cattle industry had been introduced into the Purgatoire valley by the 1860s. By 1880 the cattle

industry boom in Colorado rivaled that of the mining industry. The potential for quick and high profits attracted capitalists from the eastern United States and Great Britain. British and Scottish capital helped launch the largest companies on the Great Plains.

The Prairie Cattle Company, a Scottish syndicate, was formed in 1880 to invest in the western cattle industry. In the early 1880s the company's holdings in Colorado alone totaled 2,240,000 acres and included portions of present-day PCMS. The second largest cattle company in the PCMS region was the Bloom Land and Cattle Company, established in 1884. It was headquartered at the Circle Diamond Ranch at Thatcher, Colorado. By 1886 the company had acquired three homesteads on the PCMS located near natural springs. Eventually, the company expanded outside Colorado into New Mexico and Montana.

A significant aspect of the open range cattle industry was the practice of securing watering areas, such as springs. During this period, the early Hispanic homesteads in the region located near springs were targeted for acquisition by cattle companies. By the 1880's large Anglo-owned cattle ranches began to challenge for control of the range, often buying up water sources and allowing their herds to roam across public and private land.

By the mid-1880s, however, a number of factors were contributing to the decline of the large-scale cattle industry in the PCMS area. The number of cattle increased to the extent that the range was overstocked and overgrazed. All available land had been utilized, and even marginal lands had been overgrazed. Additionally, the Plains were hit hard by a series of blizzards and droughts, and hard winters were tough on the cattle industry. Cattle growers suffered livestock losses in the thousands, and the losses were disastrous on the remaining Hispanic ranchers in the PCMS area. By 1887 most of the Hispanic homesteads had been either sold or abandoned.

Cattle companies in the region continued to incur losses through 1895, but by the beginning of the twentieth century, profits returned as new grazing practices were implemented. While the cattle companies owned most of the water sources in the region, much of the other land on present-day PCMS was still unclaimed as late as 1915. This soon changed, however, with government efforts to promote homesteading and dryland agriculture.

An intensive period of settlement from 1916 to 1919 was due mainly to the arrival of Euro- and Anglo-American homesteaders, who were drawn largely from the nearby states of Kansas, Oklahoma, Texas, and Missouri. These individuals took advantage of newly legislated homesteading laws. In contrast to the initial period of settlement in the PCMS area, 82 percent of individuals filing land claims during this period were Euro- or Anglo-American, and only 12 percent were Hispanic.

While many homesteaders were initially successful, by the mid-1920s drought struck. Settlers gave up their claims *en masse*, selling out to established ranches in the region. With the coming of the Dust Bowl in the 1930s, dryland agriculture promoted by the government proved impossible. While ranches remained, they also underwent significant changes. In the early twentieth century, the ranching industry in the region was dominated by large companies running cattle. The 1930s, however, served to create a series of smaller sheep ranches on land acquired from homesteaders.

Sheep ranching in the region depended on a seasonal labor force of herders. Prominent ranchers living on lands now comprising the PCMS during this time included Julian C. Gunther, the Arnet family, and E.S. Bell. In the late 1940s and early 1950s the labor force of herders disappeared, and ranching shifted from sheep to cattle out of economic necessity.

Coal mining in southern Colorado began in 1875 when geologists of the U.S. geological survey identified high-quality deposits along the Front Range. The market boomed as coal was required for powering steam engines, home heating, and for smelting steel. The Walsen mine, established in 1881, represents the first commercial coal mine in the region. Other mines in the area include Starkville, Engleville, Hastings, Ludlow, Delagua, Bowen, Gray Creek, and Jewell. Several small-scale mining operations have been recorded in the Welsh Canyon area of the PCMS. Many of the southern Colorado mines closed during the 1920s and 1930s because of the Depression. Coupled with the Dust Bowl, ranchers and farmers lost their land holdings and left the area to seek employment elsewhere. For those that eked out an existence, however, many of their descendants still live in the area today.

The energy industry was established in the PCMS region during the late 1920s. In 1927 the Colorado Interstate Gas Company constructed a natural gas pipeline from Clayton, New Mexico to Denver, passing through present-day PCMS. Four booster stations were built to move the gas through the line. One of the stations was the Purgatoire Canyon Station, constructed just north of the Purgatoire River within the present PCMS boundary. The station was built in 1929 and consisted of a company village built around the compressor engine building. The village included 16 houses, two bunkhouses, a recreation hall, and a school. The school also served ranches in the PCMS vicinity.

In 1951 a new pipeline was constructed from northern Texas to Kit Carson, Colorado. The old booster station, however, was no longer necessary, and its buildings were sold at auction in 1965. In 1964 a new auxiliary pipeline was constructed from La Junta to Trinidad. This line also crossed the PCMS, heading west along the old stage line and southwest past Brown's Sheep Camp. A helium plant was constructed in Thatcher in 1930 in the former headquarters of the Bloom Cattle Company. Several PCMS sites on the area of the Big Arroyo Hills are related to this activity.

The last major development on the PCMS occurred in 1962 and consisted of a radio complex for monitoring commercial airline traffic by the Federal Aviation Agency. The acquisition of 12 ranches by the U.S. Army in 1983 formed the boundaries of the PCMS, and signaled the end of the settlement period in the area.

## Historic Development of Fort Carson

The modern history of the Fort Carson region began in 1940 when a group of Colorado Springs business and community leaders started lobbying for a military installation near their city in hopes of reviving a sagging economy. The Pikes Peak region possessed many features suited to military training, including miles of prairie for large-scale training maneuvers and a mild climate permitting year- round training.

**World War II, 1942-1945:** The U.S. Army announced plans in January 1942 to establish a military installation on approximately 60,000 acres of rangeland between Colorado Springs and Pueblo. The installation received the name Camp Carson after Army Brigadier General Christopher "Kit" Carson, famed nineteenth century frontiersman and Indian agent. The installation would encompass 5,533 acres donated by the city of Colorado Springs, 29,676 acres purchased from private owners, 262 acres acquired from the Department of the Interior, and 24,577 acres leased from the State of Colorado.

In mid-January of 1942, specifications for construction of the camp were completed and the bidding process opened. Colorado Springs Constructors, Incorporated, "The Big Five", a team of five construction firms, won the contract with the bid of \$30,054,390; signed February 1942. Companies organized under the "Big Five" included Edward H. Honnen Construction Company, Colorado Springs; Peter Kiewit, Omaha, Nebraska; Condon- Cunningham Construction Company, Omaha; Thomas Bate and Sons, Denver, Colorado, and the C.F. Lytle Company, Sioux City, Iowa. The concept of a group of contractors organized together under one large company to reduce liability risks was not entirely new; the first successful implementation was during construction of Boulder Dam. Within the framework of the package contract, each company was responsible for only the percentage it agreed to perform. Honnen, a native of Colorado, became the contractor/sponsor of the project. His experience included work on Army installations at Cheyenne, Wyoming, Rock Island Arsenal in Illinois, and Peterson Field east of Colorado Springs. Thousands of men and women, laboring around the clock, participated in construction. A force of contractors and skilled laborers were initially coordinated through union rosters nationwide.

At the peak of construction, when the unions could not provide enough skilled labor, recruitment of additional laborers from the general work force was necessary. During peak construction, the project employed close to 11,500 workers. Construction of the camp proceeded quickly. In less than a month's time after the January announcement of the establishment of Camp Carson, the first building was completed. Crews finished a large segment in a two-week period, causing the need for a Kiewit representative from the firm's home office to visit the construction site to verify the achievement.

The design layout of Camp Carson conformed to the contour of the land, thus avoiding unnecessary grading, and accounts for the banana shape of the post. Series 800 building plans, first introduced in 1941, was the architectural type used for most of the buildings constructed on Camp Carson. Dissatisfaction of design and amount of materials necessary to construct this type of architecture led to its discontinuation in October 1942. Assembly-line construction, making the headlines around the United States, was the method used at Camp Carson, as well as elsewhere. The first-floor level of a building and its foundation was staked by a transit crew, followed by a foundation crew, who drilled holes with an auger (6-minutes for each) to set in wood or concrete support piers. Framing crews consisted of two crews; construction of floors done by one crew, while the other erected walls. Prefabrication methods helped to speed construction, and as building sites were leveled pre-cut lumber arrived. A sawmill located near the railroad cut lumber planks to size, which were then shipped to Camp Carson on a specially constructed railroad spur. The D&RGW laid a spur connecting the warehouse district with Kelker, Colorado. Whenever possible, procurement of construction materials was local, and when necessary shipped in from out-of-state. Plumbing and electrical crews were subcontracted, and quickly became drawn in with the assembly-line concept of construction. As the tempo of construction increased, the Mountain States Telephone and Telegraph Company joined in the activity, hurrying to keep pace with the demand for communication.

Completed six weeks before the deadline, the Army took possession of the first segment of two-story, wood-frame buildings on June 2, 1942. When the installation's facilities were complete, they provided for 35,173 enlisted men, 1,818 officers, and 592 nurses. Most buildings were of mobilization type construction, *i.e.* buildings assembled as a component in the effort to place human and material resources in a state of readiness for war. Shortly before the contract expired, the Army negotiated additional construction of a prisoner of war internment camp, barns for 3,310 horses and mules, and 374 additional buildings to house 5,000 more enlisted men and 200 officers, raising the total cost of construction to approximately \$41 million. The

extended date for completion was November 4; the skill and expertise brought to the project by the five companies working under Colorado Springs Construction enabled completion by the deadline. In doing so, the government received a refund of nearly \$2.5 million in accordance with the “renegotiation” clause of the contract.

***Training and Mobilization:*** During World War II, four infantry divisions prepared for combat at Camp Carson. The camp’s peak troop strength occurred in late 1943 with approximately 43,000 military personnel. In June 1942, the 89<sup>th</sup> Infantry Division, from Jefferson Barracks, Missouri, reactivated at Fort Carson on July 14, and deployed in 1944. Following deployment to the European theater in January 1945, the division gained the nickname “Rolling W” while making assault crossings of the Moselle and Rhine rivers and advancing 350 miles into Germany. Created by the War Department in 1943, the 71<sup>st</sup> Infantry Division met the need for a small strike force capable of fighting in rough terrain. Activated at Camp Carson as the 71<sup>st</sup> Light Division in July 1943, the unit was designated the 71<sup>st</sup> Infantry Division on May 26, 1944, and transferred to Europe in February 1945. The 104<sup>th</sup> Infantry Division, activated in August 1943 at Camp Adair, Oregon, transferred to Camp Carson on March 11, 1944. The “Timberwolves” deployed to France in September 1944 and fought through Northern Europe from Antwerp to the Rhine River.

***Mountain and Cold Weather Training at Camp Hale:*** In 1942, Camp Hale constructed west of Pikes Peak near Leadville, Colorado, operated as a sub- installation of Camp Carson during the war. The Mountain Training Command, activated at Camp Carson on September 2, 1942, moved to Camp Hale in November. An increased need for troops trained in the art of mountain warfare led to the formation of the 10<sup>th</sup> Mountain Division. Activated at Camp Hale, Colorado, in July 1943, the 10<sup>th</sup> Mountain was the Army’s only specifically trained mountain division. Trained by Norwegian General Dagfin Dahl, the 10<sup>th</sup> Mountain Division deployed to the mountains of Northern Italy and proved instrumental in defeating the Axis powers in the Italian campaigns.

***Prisoner-of-War Camp:*** In 1942, the U.S. War Department established a prisoner-of-war (POW) camp on Camp Carson, one of 511 installations throughout the United States to detain Axis prisoners of war. Colorado was the location of more than 30 POW camps, and many served as small temporary branch camps under the jurisdiction of Camp Carson. The location of Fort Carson, not in close proximity of any crucial war industries afforded maximum security; the temperate climate of the area ensured construction costs and maintenance would be minimal.

Fort Carson’s prisoner-of-war (POW) camp opened on January 1, 1943. Original camp facilities were minimal, and meant to accommodate 3,000 enlisted men and 32 officer POWs. In January 1943, a wildfire hit Camp Carson, and swept through the POW camp destroying twenty-three buildings. In all, the fire caused over \$1 million in damage.

The initial group of 368 Italian prisoners arrived at Camp Carson in May 1943, and soon moved to another camp outside Colorado. During their short internment, the Italian POWs built a camp theater for their production of “Romeo and Juliet.” Shortly after the Italian POWs moved, German POWs arrived. Camp Carson POWs participated in athletic events, musical performances and plays. A POW library was established, a wide variety of educational classes organized, and religious services held. A POW post exchange was set-up, and prisoners published a weekly German-language newspaper. The demands of war caused a work force shortage in Colorado, which POWs help to alleviate by doing general farm work and aiding in logging operations. Prisoners earned \$0.80 a day, but the wages could range from \$0.60 to \$1.20 throughout the period of internment.

One of the largest prisoner repositories in the U.S., Camp Carson housed nearly 10,000 German prisoners, during one period from 1943 – 1946. During the war, Fort Carson incarcerated nearly 9,000 German, Italian, and some Japanese prisoners of war. In 1945, near the end of the war, Fort Carson housed an additional 5,000 prisoners in barracks located east of Pershing Field. Repatriation of all POWs to their respective homelands occurred by July 21, 1946. Archival research (1990) and archaeological investigations of 1989 and 1990 determined that there was little intact evidence of the Camp Carson Prisoner-of-War camp. Archaeological testing (1995) determined that there were no subsurface remains.

**Carson Hospital Center/Old Hospital Complex:** In 1942, the Carson Hospital Center, the largest of nine medical centers built in the nation during World War II, opened to provide immediate medical care for Camp Carson's soldiers. The Center had a 2,000-bed capacity with 11 square miles of floor space. The combined general and convalescent hospitals cared for more than 30,000 patients over the course of the war. The staff consisted of three Women's Army Corps (WAC) hospital companies, 2,000 civilians, and hundreds of doctors, nurses, and medical corpsmen. The Carson Hospital Center was also a major training center for nurses. The Army Nurse Training Center trained more than 3,000 nurses between October 1943 and the end of the war. When the war ended the Carson Hospital Center was inactivated, and a temporary separation center was established. The 400-bed center continued treating patients scheduled for release before May 31, 1946. About 9,000 soldiers from installations in a four-state area processed for discharge through the center.

The Old Hospital Complex at Fort Carson was determined as an eligible property for inclusion in the National Register in 1991. The complex, constructed of semi-permanent buildings, followed the Department of the Army's Series 800 plans. A 1991 Memorandum of Agreement (MOA) and a 2002 amended MOA with the Colorado State Historic Preservation Office, allowed for disposal of all complex buildings except Buildings #6237 and #6236. In 1995, a Historic Architectural Building Survey (HABS), and the Colorado site forms, were completed on 59 buildings in the complex, with both the interior and exterior of buildings inventoried and evaluated. Literature research and review of the Directorate of Public Works real property forms were completed and an historic context written.

In 2000, a study addressed the adaptive reuse of Building #6237 in the Old Hospital District (Clapper 2001), followed by a detailed condition assessment with budget projections (Napier and McCarthy 2000). These efforts demonstrated the considerable expense required to rehabilitate the remaining 15 buildings in the district. This led to an amendment of the 1991 MOA in 2002 to allow for the removal of 13 additional buildings, guidelines for the remodeling and preservation of Building #6237, and the preservation of Building #6236. All 13 of the other buildings remain, but demolition orders have been approved. The CRM at Fort Carson initiated Section 106 consultation with the SHPO to remove the district designation and declare individual buildings ineligible for inclusion in the NRHP. This consultation is based on the fact that the district has been significantly encroached upon by past development, and the remaining buildings have lost significant physical and/or historic integrity. The SHPO concurred on November 7, 2011.

**Cold War, 1946-1989:** By 1946, with activities greatly reduced, it appeared that Camp Carson would close. The military strength at the camp had dropped to around 600, not including 320 patients at the hospital. In April, an announcement made by the War Department verified that the camp would remain open. In late April and May, troop strength increased when the 38<sup>th</sup> Regimental Combat Team and the 611<sup>th</sup> Field Artillery Battalion transferred to Camp Carson. To



facilitate the families of enlisted men, the Army converted a large block of two-story barracks into apartment units for families of enlisted men.

A fire that started in the Broadmoor area on January 17, 1950, and driven by 50 mile-per-hour winds, soon spread over the post. It would be the worst fire to strike the post in its history. In an attempt to stop the fire, post engineer bulldozers cut a firebreak across the northern part of the post. The unceasing winds blew the fire where there were no men and equipment available to extinguish or control its velocity, causing the destruction of more than 33 buildings. Civilian volunteers and fire-fighting equipment from the surrounding town was not able to come to the camp's aid until mid-morning. Families evacuated from the housing area went to Pueblo. By noon, when the fire still blazed, it appeared total destruction was the fate of the entire camp. Wind velocity dropped by dusk, allowing firefighters finally to extinguish the fire by midnight. Six people lost their lives in the fire, and 92 buildings destroyed resulting in \$3 million in damage.

In 1950, at the onset of the Korean War, activities at Camp Carson increased. Many Reserve and National Guard units called into active duty began to arrive. The 196<sup>th</sup> Regiment Combat Team from the South Dakota National Guard, the largest unit, arrived in September. The camp also served as duty station for more than 20 engineer and artillery battalions and several miscellaneous companies and detachments. To process returning veterans, Activated in July 1951, the Camp Carson Separation Center prepared to process returning Korean War veterans. More than 100,000 soldiers were processed by the end of 1953.

As the nation emerged from war to peace in the early 1950s, Camp Carson continued to serve as duty station for approximately 25,000 troops. The future of the camp was uncertain, and the lack of approval for new construction did not indicate positive prospects. Colorado Springs was just beginning to recover from an economic recession, when an announcement indicated that Camp Carson would become a fort. The designation of the post as Fort Carson officially occurred on August 27, 1954. This distinction from camp to fort did not necessarily ensure a secure future for the post. Congress approved approximately \$3.5 million for the construction of new barracks and officer quarters. Fort Carson was authorized \$13 million for construction of 1,000 sets of family quarters, and a NCO mess hall. By the mid-1950s, cuts made to the Department of Defense's budget affected Fort Carson. Units of the 9<sup>th</sup> Infantry Division, stationed on Fort Carson, were inactivated. Efficiency experts argued that Fort Carson was too remote from main transportation arteries and population centers to be economically viable as an Army post. By 1960, the 2<sup>nd</sup> United States Army Missile Command (Medium) was the only major unit stationed at Fort Carson.

In response to the Berlin Crisis of 1961 and the Cuban Missile Crisis of 1962, two more divisions activated at Fort Carson. The 5<sup>th</sup> Infantry Division (Mechanized), formally reactivated at Fort Carson on February 19, 1962, was the first division to be organized under the "ROAD" (Reorganization Objectives Army Division) concept. Training a mechanized division triggered the need for more land. In 1965, Fort Carson acquired 24,577 acres of state land by trading it for federal land located at the Lowry Bombing Range east of Denver. In 1965 and 1966, the Army acquired a total of 78,741 acres of land south of Fort Carson's original reservation at a cost of approximately \$3.5 million. These additions brought Fort Carson to its current size of 138,523 acres.

Fort Carson opened Camp Red Devil, the first year-round training area for soldiers in a field environment on March 7, 1966. Training for Southeast Asia was also a priority at Fort Carson. By the end of 1966, Fort Carson deployed 9,000 soldiers to Vietnam, with another 9,000 deployed in 1967, and 6,000 in 1968. Activities at Fort Carson had risen to a higher level near

the end of 1968 than at any time since World War II. In October 1965, the military strength was 9,658 and by March 1967 had more than doubled with 24,735 troops. In March 1965, civilian strength was 1,337 and had increased to 2,445 in July 1967. The economic impact of Fort Carson on the Colorado Springs region rose from approximately \$55 million in 1964 to \$100 million in 2003.

Force reductions in Vietnam deployed the 4<sup>th</sup> Infantry Division back to the United States and to Fort Carson in November of 1970, replacing the 5th Infantry Division. In its new western home, the 4th Infantry Division was reorganized as a mechanized infantry division. Fort Carson would become an initial test site for The Modern Volunteer Army concept in January 1971. The 18-month field test aimed to create an environment conducive for an all-volunteer Army, with plans to incorporate the best field test experiences in future Army budgets.

The need for additional land for Army training received considerable emphasis during 1974. The Army was considering the Pinon Canyon area southeast of Pueblo, Colorado, for land acquisition by the late 1970s. Purchase of 245,000 acres in the Pinon Canyon area, 100 air miles southeast of Fort Carson, was made in September 1983 at an approximate cost of \$26 million. Relocation of eleven landowners and school bond relief cost an additional \$2 million. The Pinon Canyon Maneuver Site opened for training in the summer of 1985. In 1986, the Evans Army Community Hospital was dedicated, continuing Fort Carson's long tradition of providing medical care to U.S. citizens and soldiers.

**Post Cold War, 1990-Present:** Changes in troop units assigned to Fort Carson in the 1990s reflect the evolving role of defending the United States. The 43<sup>rd</sup> Corps Support Group, supported the 4<sup>th</sup> Division and III Corps and was deployed to Saudi Arabia in October 1990 and served in Operations Desert Shield and Desert Storm until April 1991. The 43<sup>rd</sup> sent units to Somalia in December 1992 for Operation Restore Hope, and redesigned as Area Support Group. In 1992, the 10th Special Forces Group (Airborne) arrived at Fort Carson. In 1995, a number of brigades and troop units were inactivated, reassigned or re-flagged. The 4<sup>th</sup> Infantry Division headquarters, one maneuver brigade (1st Brigade), and support units at Fort Carson were inactivated. One brigade of the 3<sup>rd</sup> Brigade Combat Team was reassigned to the 2nd Armored Division, Fort Hood, Texas, but remained at Fort Carson. The 2<sup>nd</sup> Armored Division at Fort Hood was re-flagged as the 4<sup>th</sup> Infantry Division, and the 3<sup>rd</sup> Armored Cavalry Regiment was relocated to Fort Carson from Fort Bliss, Texas. The 7<sup>th</sup> Infantry Division at Fort Carson was formed in 1999.

The tragic events of September 11, 2001, and all aspects of the subsequent war on terror, have dictated many, many changes on Fort Carson, a synopsis of which is far too detailed for this document. As such, a wealth of information about Fort Carson's Soldiers, Families, and civilian workforce, including unit deployments and stationing activities, can be found on the Fort Carson website, [www.carson.army.mil](http://www.carson.army.mil).

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### **Institutions and Agencies**

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The Colorado College, Colorado Springs, Colorado.

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### **Individuals Contacted**

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F. Lee Earley, Arapahoe Community College, Littleton, Colorado.

Priscilla B. Ellwood, University of Colorado Museum, Boulder, Colorado.

Janet Lecompte, Colorado Springs, Colorado

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## **B2.**

# **Section 106 Consultation Documents**

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## 1 **B.3.1 Agency Distribution List**

2 The following is the Section 106 Consulting Party List (Name/Mailing Address):

### 1 **Agencies and Individuals**

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13 401 Main Street  
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18 Trinidad, CO 81082  
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21 Trinidad State Junior College  
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32 Trinidad, CO 81082  
33 Ms. Jean Hinkle  
34 Otero County Commissioners  
35 13 West 3<sup>rd</sup> Street, Suite 212  
36 La Junta, CO 81050  
37 Ms. Linda Ravello, Office Manager  
38 Santa Fe Trail Association  
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40 Larned, KS 67550

41 Ms. Paula Ozzello  
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44 Trinidad, CO 81082  
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### 49 **Tribal Governments**

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52 Business Committee  
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54 Anadarko, Oklahoma 73005  
55 Mr. Eddie Hamilton, Governor  
56 Cheyenne & Arapaho Tribes of Oklahoma  
57 P.O. Box 38  
58 Concho, Oklahoma 73022  
59 Ms. Margaret Anquoe, THPO  
60 Office of Planning and Development  
61 Cheyenne & Arapaho Tribes of Oklahoma  
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63 Concho, Oklahoma 73022  
64 Mr. Wallace Coffey, Chairman  
65 Comanche Nation of Oklahoma  
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67 Lawton, Oklahoma 73502  
68 Mr. Jimmy Arterberry, THPO  
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- |                                            |                                           |
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| 1 Mr. Jeff Blythe, THPO                    | 44 Mr. Wilmer Mesteth, THPO               |
| 2 Jicarilla Cultural Affairs Office        | 45 Oglala Sioux Tribe of the Pine Ridge   |
| 3 Jicarilla Apache Nation                  | 46 Reservation                            |
| 4 P.O. Box 507                             | 47 P.O. Box 320                           |
| 5 Dulce, New Mexico 87528                  | 48 Pine Ridge, South Dakota 57770         |
| 6 Ms. Amber Toppah, Lady Chairman          | 49 Mr. James Olguin, Acting Chairman      |
| 7 Kiowa Indian Tribe of Oklahoma           | 50 Southern Ute Tribe of the Southern Ute |
| 8 Business Committee                       | 51 Reservation                            |
| 9 P.O. Box 369                             | 52 P.O. Box 737                           |
| 10 Carnegie, Oklahoma 73015                | 53 Ignacio, Colorado 81137                |
| 11 Ms. Amie Tah-Bone, Museum Director      | 54 Mr. Alden Naranjo, Acting THPO         |
| 12 Kiowa Museum and NAGPRA Program         | 55 Southern Ute Tribe of the Southern Ute |
| 13 Kiowa Indian Tribe of Oklahoma          | 56 Reservation                            |
| 14 P.O. Box 369                            | 57 P.O. Box 737                           |
| 15 Carnegie, Oklahoma 73015                | 58 Ignacio, Colorado 81137                |
| 16 Mr. Darrell O'Neal, Chairman            | 59 Mr. Darwin St. Clair, Chairman         |
| 17 Arapaho Tribe of the Wind River         | 60 Shoshone Tribe of the Wind River       |
| 18 Reservation                             | 61 Reservation                            |
| 19 Arapaho Business Committee              | 62 Shoshone Business Council              |
| 20 P.O. Box 396                            | 63 P.O. Box 538                           |
| 21 Fort Washakie, Wyoming 82514            | 64 Fort Washakie, Wyoming 82514           |
| 22 Ms. Corrine Headley, THPO               | 65 Mr. Wilford Ferris, THPO               |
| 23 Arapaho Tribe of the Wind River         | 66 Shoshone Tribe of the Wind River       |
| 24 Reservation                             | 67 Reservation                            |
| 25 Arapaho Business Committee              | 68 P.O. Box 538                           |
| 26 P.O. Box 396                            | 69 Fort Washakie, Wyoming 82514           |
| 27 Fort Washakie, Wyoming 82514            | 70 Mr. Gordon Howell, Chairman            |
| 28 Mr. Llevando Fisher, President          | 71 Ute Indian Tribe of the Uintah & Ouray |
| 29 Northern Cheyenne Tribe of the Northern | 72 Reservation                            |
| 30 Cheyenne Indian Reservation             | 73 P.O. Box 190                           |
| 31 Northern Cheyenne Tribal Council        | 74 Fort Duchesne, Utah 84026              |
| 32 P.O. Box 128                            | 75 Ms. Betsy Chapoose, Acting THPO        |
| 33 Lame Deer, Montana 59043                | 76 Cultural Rights and Protection Office  |
| 34 Mr. Conrad Fisher, THPO                 | 77 Ute Indian Tribe of the Uintah & Ouray |
| 35 Northern Cheyenne Tribe of the Northern | 78 Reservation                            |
| 36 Cheyenne Indian Reservation             | 79 P.O. Box 211                           |
| 37 P.O. Box 128                            | 80 Neola, Utah 84053                      |
| 38 Lame Deer, Montana 59043                | 81 Mr. Manuel Heart, Chairman             |
| 39 Mr. Bryan Brewer, President             | 82 Ute Mountain Ute Tribe of the Ute      |
| 40 Oglala Sioux Tribe of the Pine Ridge    | 83 Mountain Ute Reservation               |
| 41 Reservation                             | 84 P.O. Box JJ                            |
| 42 P.O. Box 2070                           | 85 Towaoc, Colorado 81334                 |
| 43 Pine Ridge, South Dakota 57770          |                                           |

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7  
8  
9  
18

10 Ms. Terri Parton, President  
11 Wichita and Affiliated Tribes of Oklahoma  
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13 Anadarko, Oklahoma 73005  
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17 Anadarko, Oklahoma 73005



1 **B.3.2 Sample Consultation Letter**

- 2 The letter below is a sample consultation letter sent to the agencies. All letters sent contained  
3 similar wording.



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
US ARMY INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CARSON  
1626 ELLIS STREET, SUITE 200  
FORT CARSON, CO 80913-4143

SEP 24 2014

Office of the Garrison Commander

Subject: Pinon Canyon Maneuver Site Training and Operations Environmental Impact Statement

Mr. Edward Nichols  
State Historic Preservation Officer  
History Colorado  
1200 Broadway  
Denver, Colorado 80203

Dear Mr. Nichols:

As you know, Fort Carson has been developing an Environmental Impact Statement (EIS) for the Pinon Canyon Maneuver Site (PCMS) regarding military training and operations activities for new tactics and equipment. The purpose of the EIS is to analyze training infrastructure to support Fort Carson and visiting units, as well as land and airspace within PCMS necessary to support other training requirements. This letter is intended as consultation correspondence in accordance with Section 106 of the National Historic Preservation Act (NHPA) regarding eight additional military training activities proposed for the PCMS.

Fort Carson is considering two alternatives in this EIS. The first is the No Action alternative, whereby current mission activities and training operations would continue, as well as range use and training land management. Routine maintenance and support operations would continue, and established parameters for brigade-level training would be utilized. Section 106 consultation would not be necessary for this alternative.

The second alternative is the Proposed Action that would enable the following readiness training elements to be conducted at PCMS to support up to brigade-sized units stationed at Fort Carson. It is Fort Carson's position that the recently executed *Programmatic Agreement Regarding Military Training and Operational Support Activities at Pinon Canyon Maneuver Site* (PCMS Training PA, 23 April 2014) currently allows for six of the eight additional training activities proposed, as noted below. Fort Carson respectfully requests any comments you may wish to provide regarding these training types.

The other two training elements require review, evaluation, and consultation under Section 106. These are: Aviation Gunnery and Flare Training and Demolitions Training. The analysis for these training activities is underway, and Fort Carson anticipates forwarding the Section 106 packet no later than November 1, 2014.

**Proposed Action Training Elements:**

1. **Armor Brigade Combat Team (BCT) Training.** Will accommodate the new force structure that incorporates an additional Combined Arms Battalion for Fort Carson's Armored BCT (ABCT). This includes the ability to incorporate an additional Light Infantry Battalion for Fort Carson's Infantry BCT (IBCT), and a Stryker BCT (SBCT) at PCMS, as the decision has been made by the Army to convert an existing Fort Carson ABCT to an SBCT. Fort Carson's 4th Infantry Division (ID) will continue BCT-level maneuver training at PCMS using its reconfigured force structure that now includes one SBCT and a larger ABCT and IBCT. In 2014 the Army inactivated one Fort Carson ABCT and augmented the remaining ABCT and IBCT with an additional maneuver battalion. The Army also relocated an SBCT from Joint Base Lewis-McChord to Fort Carson. All three BCTs received an engineering battalion. Fort Carson's 2014 *Conversion of 4<sup>th</sup> ID Brigade Combat Teams Environmental Assessment* (EA) analyzed the impacts of these actions, which resulted in enabling the BCTs to conduct training only at Fort Carson. As such, 4<sup>th</sup> ID needs to pursue and enable BCT maneuver training at PCMS in order to balance the training pressures placed upon Fort Carson and to provide for a more realistic training environment. PCMS provides optimal maneuver training space for BCTs with few training conflicts, workarounds, and/or restrictions relative to Fort Carson. With the conversion of the 4<sup>th</sup> Infantry Division (ID), vehicle usage will transition from use of mostly tracked vehicles such as tanks and Bradleys, to wheeled Stryker vehicles and a lesser number of tracked vehicles. The Stryker is a full-time four-wheel drive, selectively eight-wheel drive, armored vehicle weighing approximately 19 ton that enables Soldiers to maneuver in urban terrain, provide protection in open terrain, and transport infantry quickly to critical battlefield positions.

**Determination of Effect:** The use of foot traffic and all vehicle types are exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. It is Fort Carson's position that the use of Stryker vehicles for military training is included in this exemption, and should not be considered or treated differently than all other wheeled vehicles used for training.

2. **Aviation Gunnery (non-explosive) and Flare Training.** To enhance training readiness of Army aviation assets, helicopter pilots require aviation gunnery (non-explosive) and flare training at PCMS. Aviation units currently conduct helicopter gunnery (explosive and non-explosive) and flare survivability training at Fort Carson. At PCMS, they conduct aerial maneuver training and support BCTs during training exercises. Aviation gunnery (non-dud producing munitions) and flare survivability training is not currently authorized at PCMS. Helicopter gunnery skills are in continual need of improvement and sustainment according to Army evaluators at the National Training Center (Army, 2006), as well as a need for increased availability of gunnery training ranges. As Fort Carson aviation units provide air support to ground maneuver units during combined arms exercises, the Army desires to increase aviation gunnery training opportunities at PCMS. The Army also proposes to allow aviation units to conduct flare survivability training at PCMS. Flares are used in pilot



training to develop the near instinctive reactions to a threat that are critical to combat survival.

There is a potential for adverse effects to cultural resources from the use of Aviation Gunnery (non-explosive) and Flare Training as rotary wing aircraft fire 2.75-inch rockets at temporary targets from a hover position. Fort Carson's initial review of this undertaking shows that there are 28 protected properties located within the Surface Danger Zones (SDZ), and an additional 500 meter buffer for the established Area of Potential Effects (APE), for the two proposed gunnery lanes. Of these 13 are prehistoric, 7 are historic, 8 are multi-component, with 16 officially eligible and 12 officially needs data.

**Determination of Effect:** This training type requires Section 106 consultation to review and evaluate for the potential for adverse effects to historic properties in accordance with 36 CFR 800.4.

3. **Electronic Jamming Systems.** This training uses electronic warfare (EW) technologies that are intended to jam enemy cell phones, FM radios, ground-based sensors, improvised explosive devices (IED), and other enemy related communications through use of active or passive energy. Electronic jamming systems help Soldiers defeat IEDs by blocking radio signals that can be used by insurgents to detonate the devices remotely. For this reason, it is imperative that Soldiers are allowed to maximize training opportunities on these systems wherever they may be conducting training. These systems are used mostly on and around roads and trails.

**Determination of Effect:** All maneuver training (foot traffic or vehicle) is exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. The use of radio frequencies for EW activities during maneuver training is an incidental activity related to maneuver training. Fort Carson has determined that the use of electronic warfare technology in conjunction with military training has "*no potential to cause effect*" in accordance with 36 CFR 800.3(a)(1).

4. **Laser Targeting.** Training using vehicle mounted or dismounted laser designators and range finders. This would include air-to-air, air-to-ground, ground-to-air and ground-to-ground laser use, not to extend beyond PCMS boundaries or designated airspace. Laser-equipped systems can estimate target distance, as well as find targets in daylight, at night, and in haze, smoke, fog, and rain. Laser range finders determine range to the target with an eye-safe laser, and calculate grid coordinates with built-in GPS, elevation, and azimuth sensing capability. Laser designators provide targeting for laser-guided missiles or precision artillery rounds, and are not eye-safe. Both types of lasers are used in the current operating environment and provide for increased accuracy of munitions. Like all military equipment, training on these systems must be incorporated into as many field exercises as possible.

**Determination of Effect:** All maneuver training (foot traffic or vehicle) is exempted from further Section 106 consultation under Appendix 1.B.2. The use of laser systems is an incidental activity related to maneuver training. Fort Carson has determined that the use of laser and range finder devices in conjunction with maneuver training has *"no potential to cause effect"* to historic properties in accordance with 36 CFR 800.3(a)(1).

- 5. Demolitions Training.** This training type will conduct demolitions training in five primary and three alternate locations within Training Areas 7 and 10. Military units use demolitions while conducting combined arms breaching operations to clear paths and allow maneuver despite the presence of obstacles. Breaching is a synchronized combined-arms operation under the control of a maneuver commander. Explosive use would include C4, TNT, plastic explosives, detonating cord, Bangalore torpedoes, blasting caps, timed fuses, and igniters. Maneuver units and combat engineers must both be proficient with the breaching tactical mission task in the current operating environment.

There are no protected cultural resources located within the 8 proposed breach sites. Within a 3 km radius of these sites, there are 61 archaeological sites. Of these 44 are officially eligible (20 prehistoric, 5 historic, and 19 multi-component), 16 are needs data officially (9 prehistoric, 4 historic, and 3 multi-component), and 1 does not yet have an official determination (prehistoric). Of these 61 sites, there are 40 properties with architectural features and/or rock art of some type. A further breakdown reveals that 10 sites contain rock art, 8 of which have associated architectural features, and 8 sites have standing architecture, 3 of which have associated rock art.

In addition, there are 2 Tribal sacred sites/TCPs located within 2 km of 2 of the breach sites: 1) Cross Ranch Sacred Site was identified by the Comanche Nation, Eastern Shoshone, and Southern Ute, and is a game drive site with related rock art; and 2) Rock Crossing Sacred Site is a Southern Cheyenne TCP, and is also deemed sacred by the Southern Arapaho, Kiowa, and Comanche due to the presence of the associated rock art (Blythe, 2005). Fort Carson will initiate government-to-government Tribal consultation separate from the required Section 106 regarding these sites.

**Determination of Effect:** This training type requires Section 106 consultation to review and evaluate for the potential for adverse effects to historic properties in accordance with 36 CFR 800.4.

- 6. Unmanned Aerial Systems Training.** This training is to provide for increased training frequency for the Raven and Shadow Unmanned Aerial System (UAS) for units training at PCMS. UAS operations support battlefield commanders to plan, coordinate, and execute operations. UAS increase the situational awareness of commanders through intelligence, surveillance, and reconnaissance. Army UAS can enhance targeting through acquisition, detection, designation, and battle damage



assessment. Other UAS missions support the maneuver commander by contributing to the effective tactical operations of smaller units. Fort Carson proposes to allow for an increase in UAS training instances at PCMS resulting from the Army's 25 March 2013 decision to reconfigure Fort Carson's BCTs.

**Determination of Effect:** Aviation/aerial activities are exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. It is Fort Carson's position that the use of unmanned aerial systems is included in this exemption, and should not be considered or treated differently than other aircraft used for training.

7. **Unmanned Ground Vehicle Training.** This training enables reconnaissance and IED training using lightweight classes (500 pounds or less) of Unmanned Ground Vehicles (UGVs). Over the past decade, the use of UGVs in theater has greatly increased, providing Soldiers with enhanced capabilities to safely conduct reconnaissance missions, route clearance, and threat defeat. As threats evolve and Soldiers prepare for missions in new areas of operation, advanced robotics technology is required. UGVs would be remote controlled by trained operators at PCMS.

**Determination of Effect:** Training with all vehicle types is exempted from further Section 106 consultation under Appendix 1.B.2 of the PCMS Training PA. It is Fort Carson's position that the use of UGVs for military training is included in this exemption, and should not be considered or treated differently than all other vehicles used for training.

8. **Drop Zone Development.** This training is to provide for more suitable and safer locations for drops by establishing two new drop zones (DZs) within PCMS in areas free of obstructions and landing hazards, such as woody growth and rugged terrain. Drop zones facilitate airborne operations involving movement into an objective area of combat forces and their logistic support for execution of a tactical, operational, or strategic mission. The means employed may be any combination of airborne units, air transportable units, and types of transport aircraft, depending on the mission and the overall situation. Fort Carson has determined that two additional DZs are required at PCMS to allow for airborne operations to continue without training area conflicts.

Both of the proposed DZs have been surveyed for archaeological resources and there are 6 protected sites within the two DZs and a 100 meter buffer established as the APEs for purposes of review and evaluation. Four of these occur within the APE of Jake DZ (3 officially eligible, 1 officially needs data; 1 historic, 2 prehistoric, and 1 multi-component), and 2 occur within the APE of Sammy DZ (1 officially eligible, 1 officially needs data; both are historic sites). It is anticipated that either boulders or flexible markers will be used to protect historic properties within drop zones in order to eliminate hazards to personnel presented by fence posts.

**Determination of Effect:** Aviation/aerial activities are exempt under Appendix 1.B.2 of the PCMS Training PA. As Fort Carson is required to identify, evaluate, protect, and monitor cultural resources in accordance with Stipulation III., *Protection of Cultural Resources*, and Stipulation IV., *Monitoring and Inspecting* of the PA, and given that the historic properties within the 2 new drop zones have already been recorded, evaluated, and have official determinations of eligibility, it is Fort Carson's position that the designation and use of additional drop zones is included in exemption 1.B.2 and no further Section 106 consultation is required.

The Draft EIS will be available for public review in October 2014, at which time the document will be available online at [www.carson.army.mil/DPW/nepa.html](http://www.carson.army.mil/DPW/nepa.html). This letter has also been forwarded to the Native American Tribes with a cultural affiliation to Fort Carson lands and other established consulting and interested parties.

Points of contact for this action are Ms. Pamela Miller, Cultural Resources Manager, [pamela.k.miller26.civ@mail.mil](mailto:pamela.k.miller26.civ@mail.mil), 719-526-4484, or Mr. Wayne Thomas, Chief, NEPA and Cultural Management Branch, Environmental Division, Directorate of Public Works, [george.w.thomas16.civ@mail.mil](mailto:george.w.thomas16.civ@mail.mil), 719-526-1852.

Sincerely,



Joel D. Hamilton  
Colonel, U.S. Army  
Garrison Commander

Enclosure



